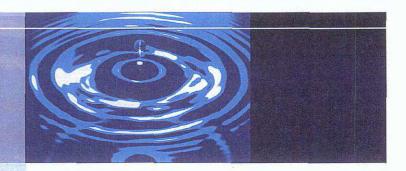
APPENDIX J CEQA Drainage Study



CEQA Preliminary Drainage Study

Peaceful Valley Ranch San Diego, California

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April 2007

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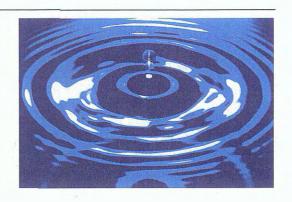
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Introduction

This drainage report presents an analysis of the effects the proposed Peaceful Valley Ranch subdivision might have on the *quantity* and *pattern* of storm water runoff in the local watershed. The purpose of this report is to help fulfill requirements of the California Environmental Quality Act (CEQA). Storm water *quality* is addressed in the Storm Water Management Plan (SWMP) for the project, under separate cover from this document.

This report examines the existing and proposed hydrology of the site and nearby watershed and presents preliminary design of drainage facilities. This report is for planning purposes and does not present final design engineering recommendations for the project.

Section 1. Project Information

This section describes the location, activities, and hydrologic setting (watershed, topography, land use, soils and vegetation, drainage patterns, and impervious cover) of the project site.

1.1. Project Description

1.1.1 Project Location

The project site is located in the community of Jamul in San Diego, California. The project is located just east of SR-94 (reference Thomas Bros. 1291-J3). **Exhibit A** provides a location map for the site.

1.1.2 Project Activities Description

The Peaceful Valley Ranch project proposes the subdivision of 181.31-acres for an estate residential development, equestrian uses and amenities, and fire service facilities. The development plan includes a total of 57 lots consisting of: (a) 46 – new estate residential lots ranging in size from a minimum of 2-acres up to approximately 7.7-acres (Lots 1-4, 6-47); (b) one estate residential lot of 4.0-acres for the existing Ranch House (Lot 5); (c) one 6.7-acre equestrian facility lot (Lot 48); (d) one 3.7-acre lot reserved for a new joint-use fire station and administrative offices of the RFPD and US Fish and Wildlife Service (Lot 49); (e) one open space lot (3.7 acres) for the protection of biological resources (Lot 50); (f) one 28.9-acre private horse stable and training facilities / polo field lot (Lot 51); and, (g) six private roadway lots (Lots 52-57).

A 3.7-acre lot on the west side of the site (Lot 49, adjacent to SR-94), is proposed for joint use by the Rural Fire Protection District (RFPD) and the United States Fish and Wildlife Service (USFWS) as a future site for a fire station and administrative offices. A separate drainage report covers the development of this site.

The public and private equestrian uses each consist of boarding, breeding, training and sales of specially trained horses. The proposed Peaceful Valley Ranch (PVR) project will also feature a trail system that traverses the site. A main feature of the trail system will be its routing parallel and adjacent to the main on-site drainage. The trail system will provide opportunities for recreational walking, hiking, and equestrian uses and will allow for future linkages to public off-site trails at the northerly and southerly property boundaries.

1.2. Hydrologic Setting

This section summarizes the project's size and location in the context of the larger watershed perspective, topography, soil and vegetation conditions, percent impervious area, natural and infrastructure drainage features, and other relevant hydrologic and environmental factors specific to the project area's watershed.

1.2.1 Watershed

The project site is located within the 7,795-acre (12.2-square mile) Jamul Hydrologic Sub-Area (HSA 910.33), which is part of the Dulzura Hydrologic Area (HA 910.30) and Otay Hydrologic Unit (HU 910.00). The 181.3-acre project accounts for approximately 2 percent of the local HSA watershed area. The drainage area discharging into the Unnamed Tributaries of Jamul Creek as they pass through the project site totals slightly over 4 square miles, or approximately 33 percent of the HSA. Table 1-1 compares the project site to the local HSA watershed area. Exhibit B illustrates the project site in the context of the watershed.

	Area (acres)	7,795	2,591	181
Jamul HSA 910.33	7,795	100%		
Jamul Creek Tributary @ the D/S property limits	2,591	33%	100%	
Project Site	181	2%	7%	100%

Table 1-1 Comparison of Watershed Areas.

1.2.2 Topography

The topography of the watershed is generally steep. Runoff typically flows towards the south on the surface until reaching one of the many streams in the watershed. Once in a stream, runoff flows towards the south confluencing with other streams. The watershed has only a few drainage improvements; surface flows in natural channels account for the majority of runoff within the watershed.

1.2.3 Current and Adjacent Land Use

The project site is currently used for agricultural purposes and a couple of private residences. The community of Jamul surrounds the project site. Low-density residential housing with pockets of commercial development exist to the north, west, and east. The California Department of Fish and Game manages an open space parcel to the south of the project site. **Exhibit C** and **Exhibit D** illustrate the County of San Diego General Plan and Zoning near the project site, respectively.

1.2.4 Soil and Vegetation Conditions

No soils report has been prepared at this preliminary stage of the project. Therefore, the Soil Survey for the San Diego Area by the Soil Conservation Service (1973) forms the basis of this discussion. The Soil Survey indicates that there are numerous soil types present in the watershed. While all SCS Hydrologic Soil Types are present, Soil Types "B" and "C" dominate the watershed. Almost all the soils on the project site are considered severely erodible. **Table 1-2** summarizes the soils in the watershed. **Exhibit E** illustrates the soil types and watershed limits.

Table 1-2 Summary of Site Soil Types.

Soil Name	Symbol	Hydrologic Soil Type	Erodibility	
Tujunga Sand 0-5%	TuB	A	Severe	
Cienaba Coarse Sandy Loam 15-30%	ClE2	В	Severe	
Cieneba Very Rocky Coarse Sandy Loam 30-75%	CmrG	В	Severe	
Cieneba Rocky Coarse Sandy Loam 9-30%(Eroded)	CmE2	В	Severe	
Greenfield Sandy Loam 0-2%	GrA	В	Severe	
Vista Coarse Sandy Loam 15-30%	VsE	В	Moderate	
Vista Coarse Sandy Loam 15-30% (Eroded)	VsE2	В	Moderate	
Fallbrook Sandy Loam 9-15% (Eroded)	FaD2	C	Severe	
Fallbrook Sandy Loam 15-30% (Eroded)	FaE2	C	Severe	
Fallbrook Rocky Sandy Loam 9-30% (Eroded)	FeE2	C	Severe	
Fallbrook-Vista Sandy Loam 9-15%	FvD	C	Severe	
Cieneba-Fallbrook Rocky Sandy Loam 9-30%	CnE2	C	Severe	
Cieneba-Fallbrook Rocky Sandy Loam 30-65%	CnG2	C	Severe	
Ramona Sandy Loam 2-5%	RaB	C	Severe	
Ramona Sandy Loam 5-9% (Eroded)	RaC2	C	Severe	
Ramona Sandy Loam 9-15% (Eroded)	RaD2	C	Severe	
Las Posas Fine Sandy Loam 5-9% (Eroded)	LpC2	D	Severe	
Las Posas Stony Fine Sandy Load 9-30%	LrE	D	Moderate	
Plancentia Sandy Loam 9-15% slopes (Eroded)	PeD2	D	Severe	
Plancentia Sandy Loam 2-9% slopes Las Posas Stony Fine Sandy Loam 15-30%	PeC	D	Severe	
(Eroded)	LpE2	D	Severe	

In addition, we examined the County's Runoff Potential Map for the area and have included the map as **Exhibit E**. This map confirms the conclusions reached using the SCS soils data.

A number of vegetation communities exist within the watershed. This report uses GIS data available from the SANDAG GIS website as the basis of this discussion. This data was revised in February 1996 and is based on Holland's descriptions of the terrestrial vegetation communities in San Diego County. Field observations made during the preparation of this report supplement this information. **Exhibit G** illustrates the vegetation covers found in the watershed.

1.2.5 Existing Drainage Patterns and Facilities (Narrative)

The watershed generally drains from north to south. Two Unnamed Tributaries to Jamul Creek (one running north-south and the other running east-west) run through the middle of the project site and there are numerous feeder streams within the watershed. Because the majority of the watershed is undeveloped, there are few storm drain facilities present. Drainage paths through the low-density residential areas are typically accomplished via natural streams, open channels/ditches, and overland flow. Occasional culverts are used to convey flows from one side of a road to the other.

1.2.6 Floodplain Mapping

The Federal Emergency Management Agency (FEMA) has not mapped any Special Flood Hazard Areas (SFHAs) for the Unnamed Tributaries of Jamul Creek on the project site. **Exhibit H** illustrates the FEMA Federal Insurance Rate Map (FIRM) near the project site.

1.2.7 Downstream Conditions

RBF Consulting performed a field visit in May 2003 and again in July 2004 to examine the project site and watershed. In this area, the Unnamed Tributaries Jamul Creek appear to be ephemeral streams with mild amount of sedimentation. At the time of the field visit, the banks were well vegetated and relatively stable. Some concrete debris was noted in the channel. **Figure 1-1** illustrates the typical condition of the drainage channels near the project site.



Figure 1-1 Existing Channel of Jamul Creek Tributary on Project Site (May 2003).

1.2.8 Impervious Cover

Impervious cover varies considerably within the watershed. The majority of the watershed is undeveloped and does not contain manmade impervious area. In the low-density residential areas, roads, houses, and other structures combine to provide some manmade impervious area. Under existing conditions, the project site itself has little impervious cover. The project will convert approximately 16 acres (equivalent to 9 percent of the 181 acres) of impervious area to the project site. This estimate assumes that each residential unit will contribute 7500 square feet of impervious area, and that there will be approximately 9300 linear feet of 32-foot wide access roads.

Section 2. Methodology and Design Criteria

This section summarizes the design criteria and methodology applied during drainage analysis of the project site. The design criteria and methodology follow the County of San Diego Hydrology Manual (June 2003) and the Hydraulic Design and Procedure Manual (April 1993) as appropriate for the project site.

2.1. Hydrologic Design Methodology

2.1.1 NRCS Hydrologic Method: Peak Flow

Runoff calculations for this study were performed using the Natural Resources Conservation Service (NRCS) Hydrologic Method approach. This method was selected because the watershed area exceeds four square miles; thus, the Rational Method was not appropriate to model the watershed's peak flows. The NRCS Hydrologic Method differs from the Rational Method in a number of ways, including: it considers the time distribution of rainfall, initial rainfall losses to interception, and uses an infiltration rate that decreases over the length of a storm.

The County's Hydrology Manual summarizes the NRCS Hydrologic Method as including the following steps:

- 1. Delineation of the watershed on a map and determination of watershed physical characteristics including location of centroid, total length and length to centroid, soil type, and land use/land treatment,
- 2. Determination of time to peak, the elapsed time from the beginning of unit effective rainfall to the peak flow for the point of concentration, and/or lag time, the elapsed time from the beginning of unit effective rainfall to the instant that the summation hydrograph for the point of concentration reaches 50% of ultimate discharge,
- 3. Determination of frequency of design storm, and determination of total rainfall amount for the design storm and precipitation zone number (PZN) for the watershed location,
- 4. Preparation of incremental rainfall distribution,
- 5. Adjustment of incremental rainfall depths based on watershed area,



- 6. Determination of composite curve number (CN) for the watershed, which will represent different combinations of land use and soil type within the drainage area and describe the proportion of rainfall that runs off,
- 7. Adjustment of CN based on the PZN Condition,
- 8. Determination of excess rainfall amounts using the PZN adjusted composite CN for the watershed and the depth-area adjusted incremental rainfall distribution,
- 9. Using the dimensionless unit hydrograph approach, development of the hydrograph of direct runoff from the drainage area.

NRCS Hydrologic Method calculations were accomplished using the HEC-HMS computer software package. The 100-year storm hydrograph was computed for both the existing and proposed conditions. Supporting calculations, HEC-HMS input and output files, and resulting hydrographs are contained within Appendix A and Appendix B. In addition, Appendix A and Appendix B also contains hydrologic work maps showing the watershed and sub-basins for both the existing and proposed conditions.

2.1.2 Roadside Swales

The project proposes to use roadside swales to convey runoff alongside streets in certain locations. These swales would assist the project in meeting its water quality goals by acting as a Best Management Practice. Because the majority of lots do not discharge runoff into the street and therefore the roadside swale, it is anticipated that peak flows in the swales will be limited. However, concerns of erosion in these swales will need to be addressed during final engineering. If the velocity of flows in the swales is too large, the swales will erode, creating both water quality and other concerns. During final engineering design as part of the grading permit process, the specific flow rates, velocities, and swale design will be examined carefully. This will verify that the swales will perform as desired under the final design conditions.

The final engineering design of the roadside swales including supporting calculations will be submitted for review during the grading permit application process.

Section 3. Hydrologic Effects of Project

This section characterizes the quantities and location of storm water runoff from the project site. Discussion of the water quality aspects of the project can be found in the Storm Water Management Plan (SWMP), which is under separate cover from this report.

3.1. Drainage Patterns

The proposed project will not significantly alter drainage patterns on the site. Runoff from the project site may be concentrated at storm drain outfalls and culvert crossings, but is not diverted from its existing outlet locations.

3.2. Impervious Cover

The project will add approximately 16 acres of impervious area (9 percent of the project site) in the form of rooftops, streets, and access roads.

3.3. Peak Runoff

The project will not increase the peak 100-year storm discharge from the four square mile watershed. While the proposed development will add impervious area, and therefore raise the curve number associated with the project site, the project site is located near the bottom of a four-plus square mile watershed. This location is crucial to the project's effect on peak discharges.

Because the proposed development lies in the lower portion of the watershed, runoff from these areas will reach Jamul Creek faster than under existing conditions. By reaching Jamul Creek earlier, peak discharges from the proposed development will have already passed when the peak discharges associated with the much larger upstream areas reach the confluence point.

Table 3-1 summarizes the hydrologic effects in terms of calculated peak runoff from the watershed under both existing and proposed conditions. These flows are considerably higher than the County has previously calculated in their Zone 4 Report (1975) or their 1991 Development of Drainage Fee Rates for Eight Unincorporated Areas of San Diego County. One potential reason for these discrepancies is the quality of the topographic information used in the earlier studies. The original studies appear to have used USGS 15-minute quad maps whereas this study uses 7.5-minute quad maps. The four-fold increase in accuracy of the topography allows a much better delineation of watershed limits.

Table 3-1 Summary of Hydrology Analysis.

A small piece of the project area lies outside the watershed boundary shown on the work maps in Appendices A and B. This area drains towards the west into existing culverts under State Route 94. A portion of this small area is proposed for use as the fire station. This lot previously submitted a hydrology report to the County for approval under separate cover. The project proposes to construct a detention basin within this lot to attenuate peak flow increases resulting from the fire station development. This will ensure peak flows do not increase in this area. We have included a copy of this study in **Appendix D**. The remaining westerly area is generally devoid of improvements; therefore, runoff coefficients in this area will not increase and peak flows will not increase.

3.4. Project Effects to Facilities along Jamul Creek (West of Project Site)

This project has considered potential drainage effects to Melody Road and State Route 94. The County report Comprehensive Plan for Flood Control and Drainage San Diego County Flood Control District Zone 4 (1975) and Development of Drainage Fee Rates for Eight Unincorporated Areas of San Diego County (1991) identify the existing 60-inch RCP culvert crossing in Melody Road as deficient to convey the peak 50-year discharge. This culvert lies in a sump along Melody Road, approximately two feet lower than the nearby SR-94.

Appendix B contains a HEC-RAS analysis and work map that determines the depth of flooding under a 50-year event caused by this culvert deficiency. Based on this analysis, the limits of flooding under a 50-year storm remain below the elevation of the SR-94/Melody Road intersection and are contained within the Melody Road sump. We also examined the sensitivity of this analysis to changes in peak flows. If the peak discharge is doubled, from 338 cfs (peak 50-year flow per the Zone 4 Report) to 676 cfs, the water surface remains below that of SR-94. These analyses assume that flows are contained in the creek until reaching the culvert.

In addition, the project does not propose to increase peak flows discharging to this branch of Jamul Creek. Therefore, effects to or from the west branch of Jamul Creek are minimal.

3.5. Project Effects on Tributaries to Jamul Creek (Through Project Site)

The Zone 4 Report does not contain any recommended facility upgrades within the project limits. The Zone 4 report and the 1991 study both recommend flood plain overlay zones to deal with the potential issue of channel erosion. This project proposes to dedicate an easement to the County covering the entire 100-year floodplain. In addition, the lots fronting the floodplain are further limited from constructing structures within 100 feet of the biological easement. Since the biological easement and flood plain limits are relatively close to each other, the effect is to widen the no structure zone around the floodplain.

The project proposes to affect the creek directly in two locations. Two creek crossings will be constructed to allow traffic flows across the creeks. Both of these crossings are contained in the project's HEC-RAS model. While the final engineering of these two structures has not been completed, the preliminary HEC-RAS modeling demonstrates that neither structure will cause an increase in water surface elevation during a peak 100-year event in the adjoining properties. Appendix C contains the HEC-RAS model and work maps used in these analyses.

The purpose of this study is to satisfy CEQA requirements. Per the County of San Diego's request, a new watershed study will be prepared during the final engineering phase (grading permit) to determine the peak flow at each bridge crossing. The final engineering watershed study will utilize a single basin covering the entire upstream

watershed in determining the peak discharges used in the bridge structures' design.

3.6. Project Effects on Caltrans Facilities (SR-94)

The proposed project does not increase the peak 100-year discharges to State Route 94. The fire station lot (see attached drainage study) proposes a detention basin to reduce post-project flows to existing levels. The results of the watershed analysis contained in this study show that the peak 100-year discharge at State Route 94 once this project is constructed does not increase over existing levels. Therefore, the project does not negatively affect Caltrans facilities along State Route 94.

However, if during final engineering the project's design changes such that it then affects a culvert along State Route 94, the affected culvert will be replaced with a structure meeting both Caltrans and County standards.

3.7. Project Effects on Downstream Facilities along Jamul Creek

The Zone 4 report and 1991 study listed above do not address Jamul Creek downstream of the proposed project site. Therefore, there are no recommended facility upgrades within this reach of creek contained in either document. Additionally, based on the results of the hydrologic modeling, this project does not increase the peak 100-year discharges from the project site at State Route 94.

Section 4. Summary and Conclusions

This section provides a summary discussion of the potential effects of the proposed project on local water resources in terms of quantity and location.

- The proposed project will not significantly alter drainage patterns on the site. While some localized drainage diversions to facilitate grading of roads and lots does occur, these diversions are contained within the project limits. Off-site runoff diversions are not anticipated.
- * The project will add not increase peak 100-year discharges in Jamul Creek or its tributaries from the 4-square mile watershed at State Route 94.
- * The project proposes a combination detention/Best Management Practices (BMP) basin on the fire station lot to attenuate peak flow increases to existing flow levels (drains to culverts under SR-94). Addressed in a separate report (see Appendix D).
- There are no County Master Plan drainage facilities shown on Plate 5 in the approved Comprehensive Plan that would affect the project.
- * The project will not substantially alter the existing drainage of Jamul Creek or its tributaries and should not cause an increase in either on- or off-site erosion/siltation. The project will not cause peak 100-year discharges to increase at the State Route 94 culvert and because the project does not propose channelization of the existing streambed.

- * The project will not cause flooding on- or off-site to people or property substantially by altering the existing drainage patterns (they substantially remain the same), altering the stream course (no realignment of the streambed is planned), or by increasing the peak runoff (the peak 100-year runoff in Jamul Creek at State Route 94 does not increase as a result of the project).
- * The project will not affect the capacity of existing drainage facilities on- or offsite. The project site currently contains no drainage improvements and the bridge improvements proposed as part of this project will be designed to convey the peak 100-year flows without causing flooding of proposed structures or causing increases in the floodplain off-site. Peak 100-year discharges at the State Route 94 crossing do not increase and therefore, do not affect the capacity of the existing drainage facility at this location.
- * The project will not affect the capacity of future facilities on- or off-site at the State Route 94 crossing beyond the extent that existing peak discharges already have an effect. Future developments should prepare watershed analyses to confirm that increases in peak flows will not occur because of their proposed projects. Given the vast number of potential projects and the crucial relationships between basin size, time of concentration, and hydrograph routing, it is critical that each project consider its effect on the watershed.

Section 5. CEQA Summary

This section summarizes the results of the hydrology and drainage analysis in the context of CEQA significance guidelines.

5.1. Drainage

5.1.1 Erosion and/or Sedimentation

Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?

No. The project will not substantially alter existing drainage patterns of the site area in a manner that would result in substantial erosion or siltation. The project does not alter the course of a stream or river, and the project does not divert runoff from existing outfall locations.

- The project proposes to preserve the alignment and profile of the streambed of the Jamul Creek tributaries on the project site. Stream crossings will be constructed as clear spans or with similar low-impact configurations, which will minimize disruption to the hydraulic and sediment regime of the streams.
- □ Flows may be concentrated at certain locations, including culvert and storm drain outfalls. However, all existing and proposed culverts and storm drain outfalls are outfitted with appropriate energy dissipation devices. These

energy dissipation devices, along with other storm water BMPs, will help preclude significant erosion and/or siltation on-site and off-site.

5.1.2 Flooding

Does the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?

No. The project will not substantially alter existing drainage patterns of the site area in a manner that would result in flooding on- of off-site. The project does not alter the course of a stream or river, and the project does not divert runoff from existing outfall locations.

- The proposed project will not significantly alter drainage patterns on the site. While some localized drainage diversion may occur to facilitate grading of roads and lots, these diversions are contained with the project limits, and off-site runoff diversion is not anticipated.
- □ The drainage study demonstrates that the project will not increase the peak 100-year storm discharge from the 4-square mile Jamul Creek Tributary watershed. While the proposed development will add impervious area, it is located on the downstream portion of the watershed. Therefore, peak discharges from the project site pass through before peak discharges associated with the much larger upstream areas reach the confluence point.
- □ The drainage study for the fire station (see Appendix D) demonstrates that there is no increase in flow toward culvert at SR-94. The fire station lot proposes a detention basin to attenuate peak flows exiting the lot toward the east to levels equivalent to the existing condition.
- The drainage study demonstrates that the project will not create flooding at intersection of Melody Road and SR-94.

5.1.3 Drainage System Capacity

Does the project create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems?

No. The project will not create or contribute to runoff water that would exceed the capacity of existing or planned storm water drainage systems.

- □ The drainage study for the fire station (see Appendix D) demonstrates that there is no increase in flow toward the 12-inch culvert at SR-94 near the proposed fire station entrance.
- The Comprehensive Plan identifies the existing 60-inch culvert at Melody Road as inadequate to convey a 50-year discharge. However, the drainage study demonstrates that flooding does not overtop the Melody Road, the



Melody Road/SR-94 intersection, and does not inundate adjacent structures under the existing or the proposed condition. This condition satisfies the primary criteria of the San Diego Drainage Design Manual (July 2005).

☐ The project would not affect any County master-planned drainage facilities, per the Comprehensive Plan, Plate 5.

5.2. Flood Hazards

5.2.1 Residential Flood Hazard

Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps?

No. The project does not propose to locate any housing within the 100-year flood hazard area.

□ The project does not propose any development within the 100-year floodplain or other Special Flood Hazard Area (SFHA) designated by FEMA or the County of San Diego.

5.2.2 Flood Flow

Does the project place within a 100-year flood hazard area structures that would impede or redirect flood flows?

No. The project does not propose to locate any structures or grading in the floodplain that would impede or redirect flood flows.

- □ The project does not propose any development within the 100-year floodplain or other Special Flood Hazard Area (SFHA) designated by FEMA or the County of San Diego.
- Stream crossings will be constructed as clear spans or similar low-impact configurations, which will minimize disruption to the hydraulic and sediment regime of the streams.

5.2.3 Flood Hazard

Does the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

No. The project does not place any people or structures at significant risk of loss, injury, or death due to flooding.

□ The project does not propose any development within the 100-year floodplain or other Special Flood Hazard Area (SFHA) designated by FEMA or the County of San Diego.

□ The project will ensure emergency access during significant flood events. The project does not propose the construction of levees and/or dams, and is not located behind a levee or below a dam that would present a flood hazard upon its failure.

5.2.4 Other Hazards

Is the project at significant risk of inundation by seiche, tsunami, or mudflow?

No. The project is not located within an area at risk of inundation by seiche (lake slosh) tsunami, or mud flow.

5.3. Waiver and Release Agreements

The project does not alter downstream flow characteristics significantly, either due to increase in flow or flood condition, diversion of flow, or flow concentration. Therefore, it should not be necessary to obtain waiver and release agreements from any affected property owners.

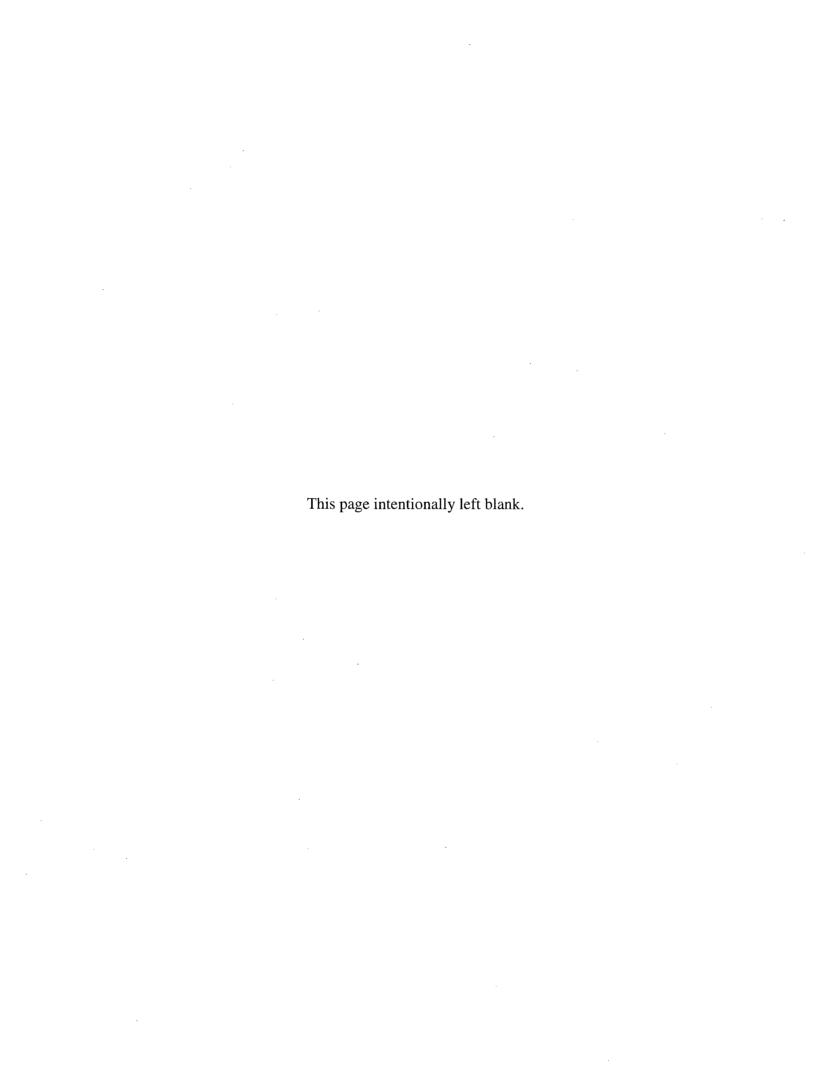
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SCS, 1973. Soil Conservation Service. (December, 1973). Soil Survey, San Diego Area, California.





Certification

This Preliminary Drainage Analysis has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based. The plans and specifications in this Preliminary Drainage Analysis are not for construction purposes; the contractor shall refer to final approved construction documents for plans and specifications.

Brian K. Oliver RCE 60627 *4 126 | 0* April 2007

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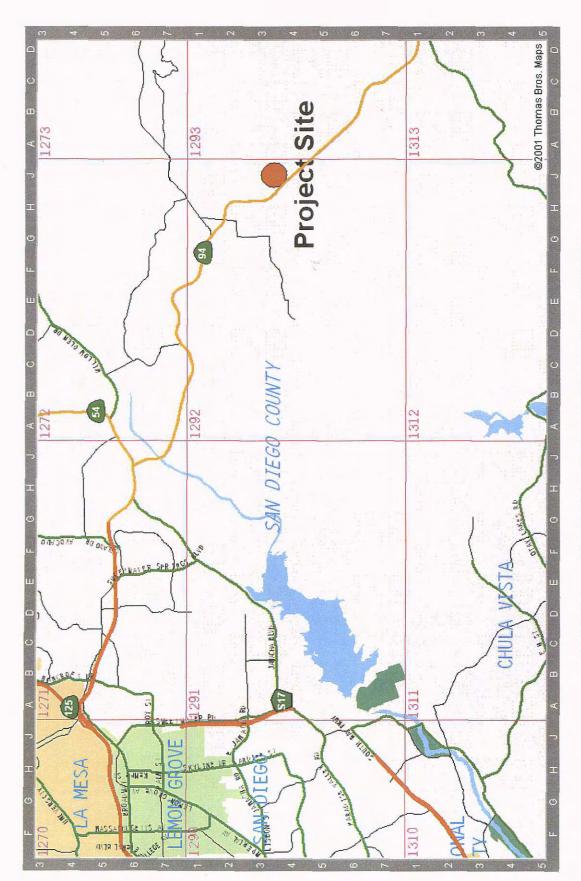
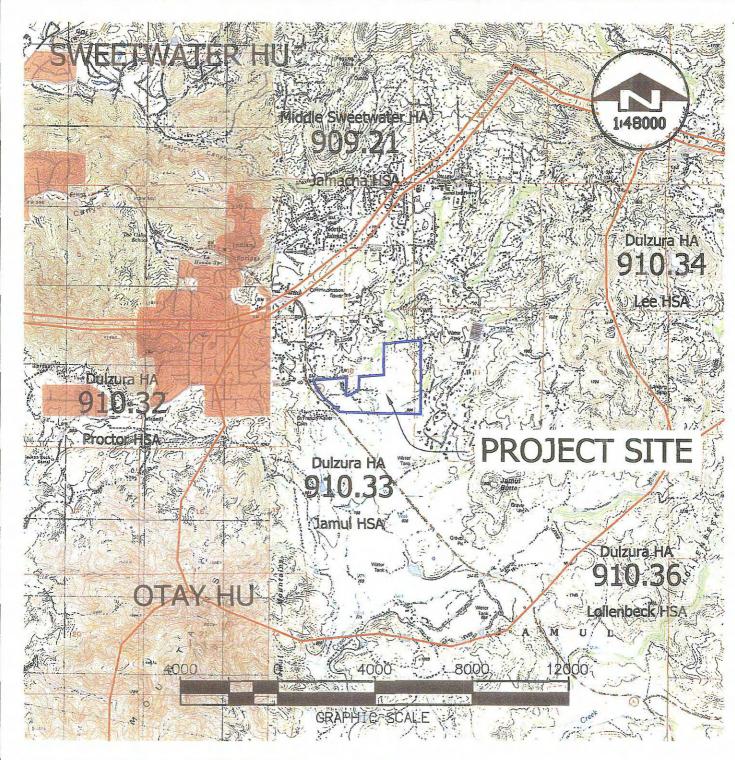


Exhibit A Vicinity Map (Reference Thomas Bros. 1292-J3)





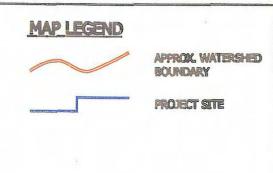


EXHIBIT B WATERSHED VICINITY MAP

PEACEFUL VALLEY RANCH REF.IN 25-100796.001



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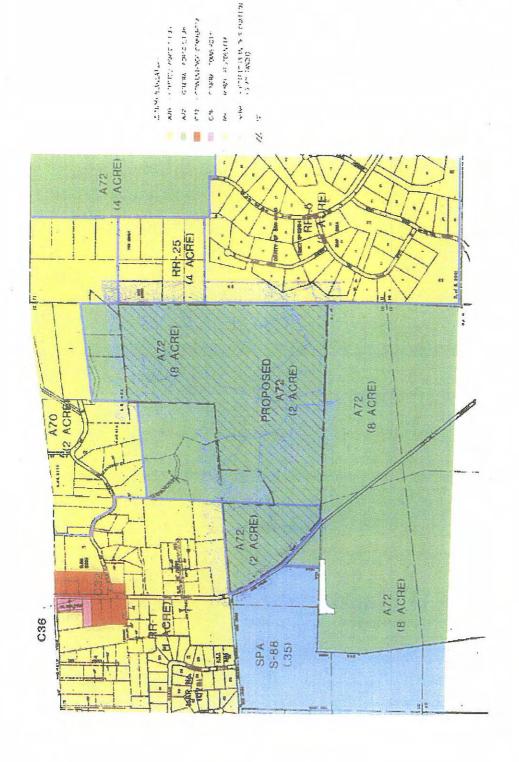
OT CRAIN PART CONTRACT AND ACT CXIX. PA & D. WILL CALLUSTIC.

CONSULTING 25100796/796ex12.01

Not to Scale

Existing and Proposed General Plan Desigations Peaceful Valley Ranch

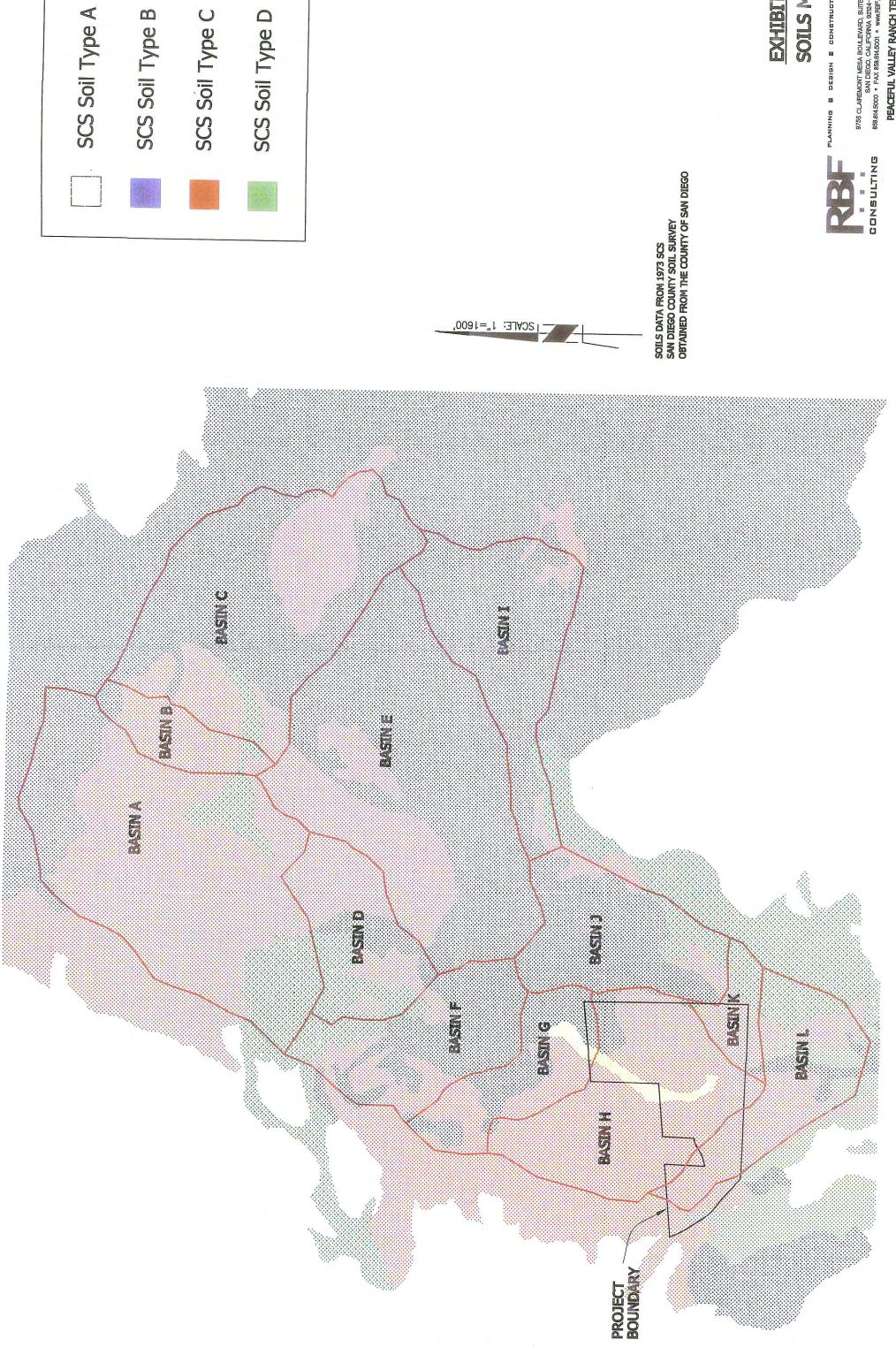
Exhibit C



Existing and Proposed Zoning Regulations

Peaceful Valley Ranch



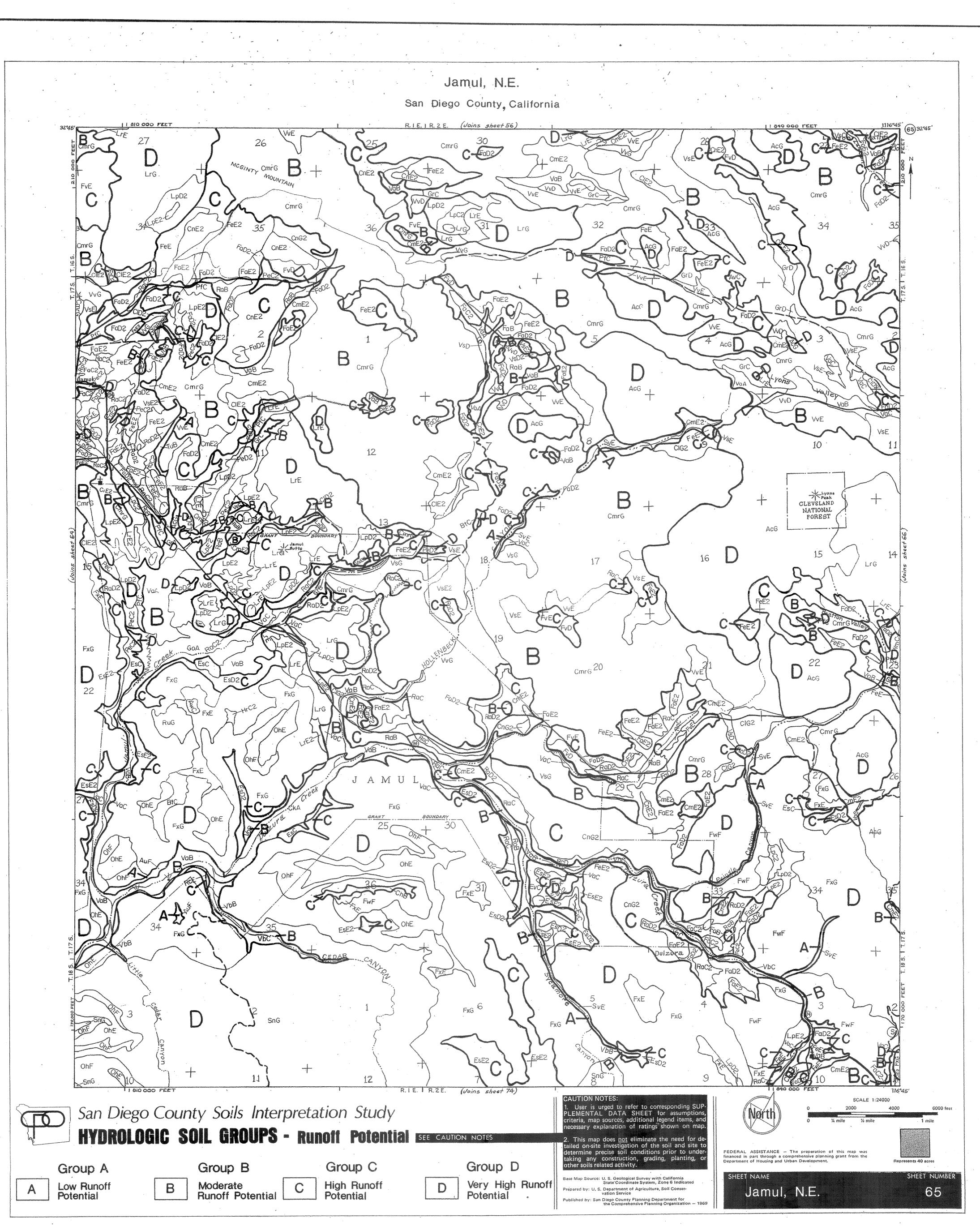


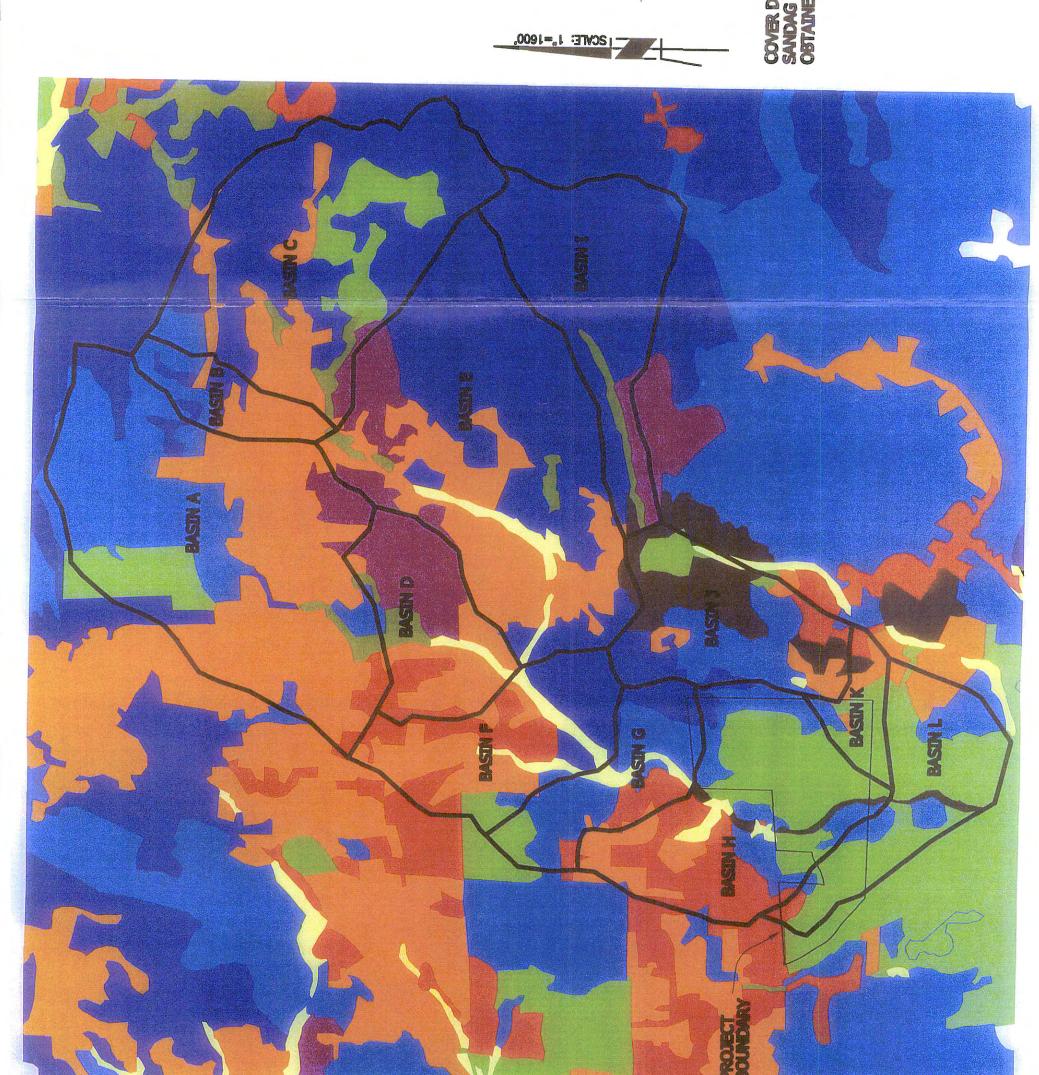
SOILS MAP EXHIBIT E 9755 CLAHEMONT MESA BOULEVARD, SUITE 100 SAN DIEGO, CALIFORNIA 92124-1324 858.614.5000 = FAX 858.614.5001 = www.RBF.com

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PEACEFUL VALLEY RANCH TENTIVE MAP RBF JN 25-100224,001







NON-HATIVE DISTURED

ROW GROPS/ORGHAND CONSTAL SACE SOUR CHPARRAL

C. SACE - CHAPARRAL SCRUB WOODLAND-GRASS

LIVE OAK REPARTAN FOREST LIVE CAK WOODLAND

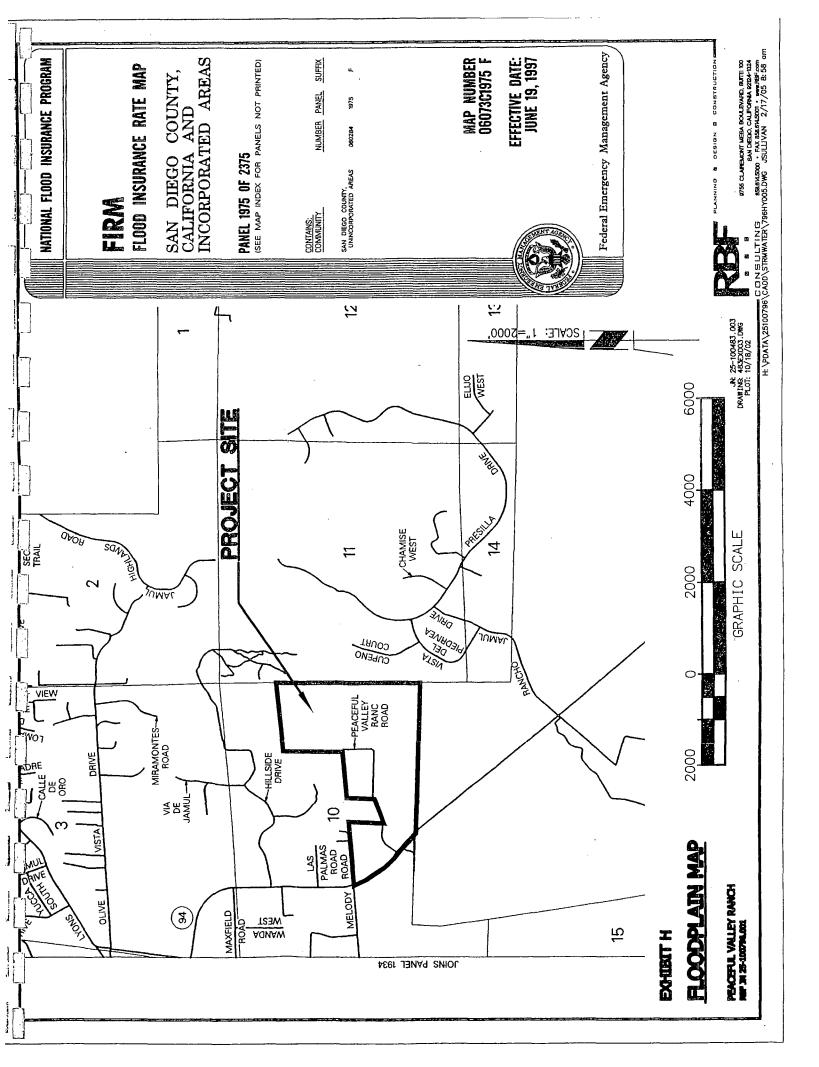
COVER DATA FROM 1995 SANDAG VEGETATION METADATA OBTAINED FROM SANDAG

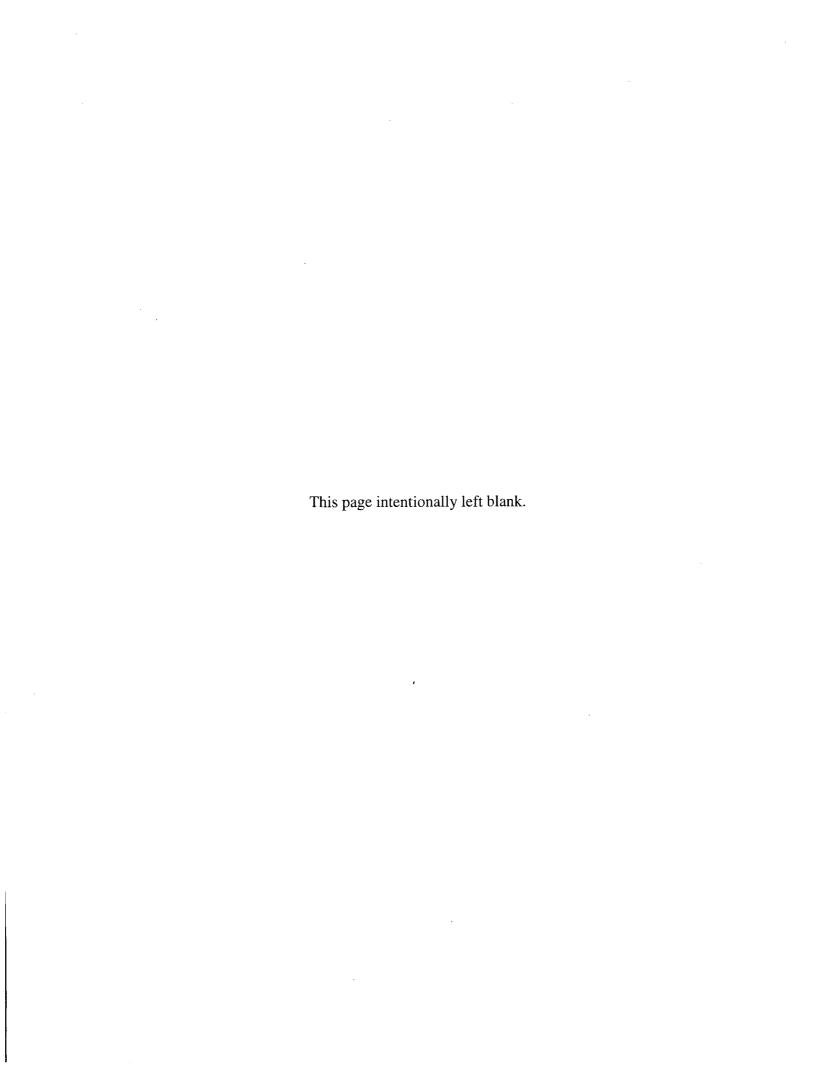
COVER MAP EX-IIBIT G

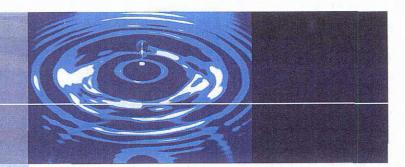
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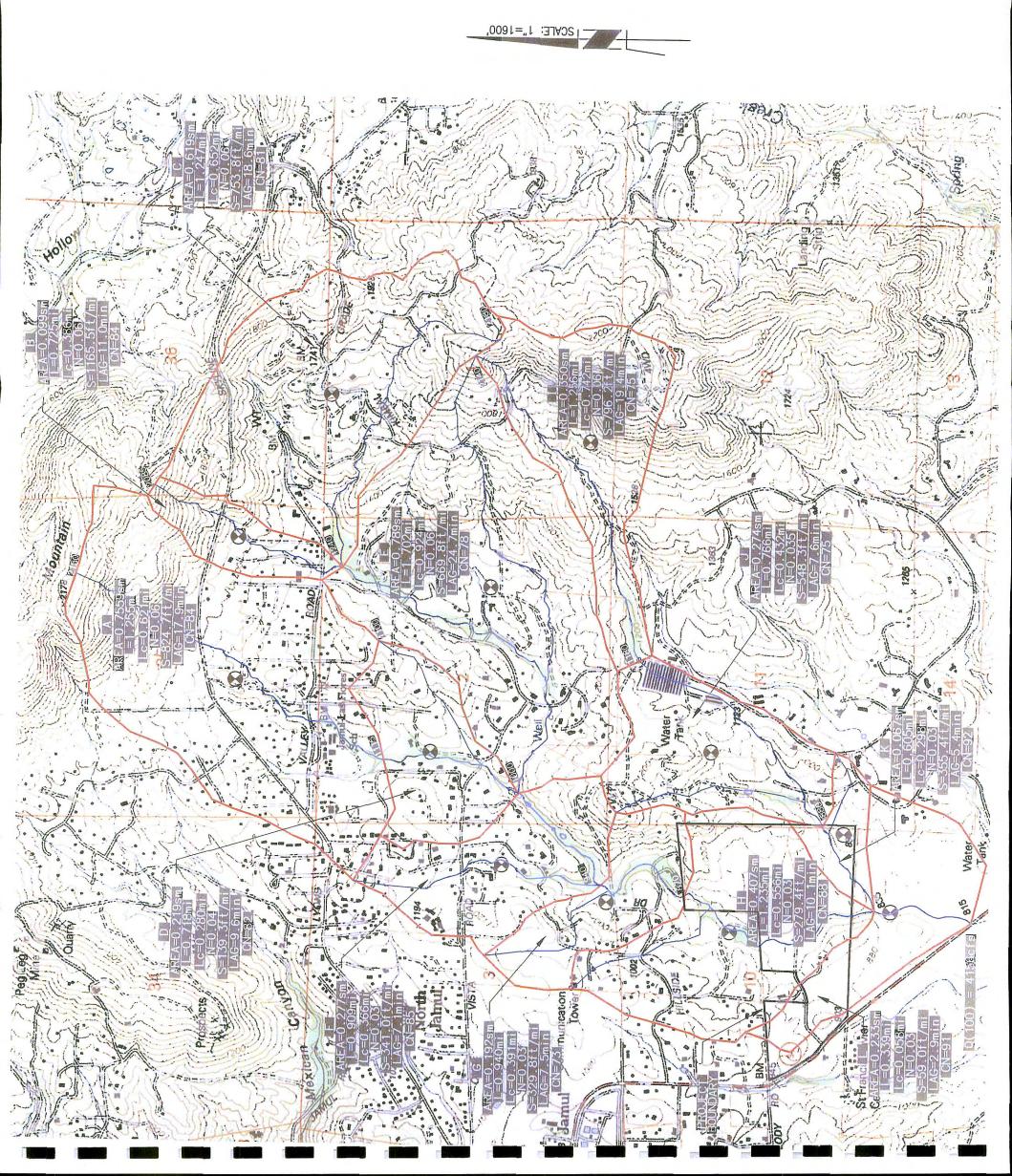




APPENDIX A Existing Conditions Hydrology

This Section Contains:

- Work Map
- HEC-HMS Schematic
- HEC-HMS Summary Output
- HEC-HMS Basin Input File
- Lag Time Calculations
- Curve Number Calculations



PEACEFUL VALLEY RANCH HYDROLOGY WORK MAP EXISTING CONDITION

LEGEND

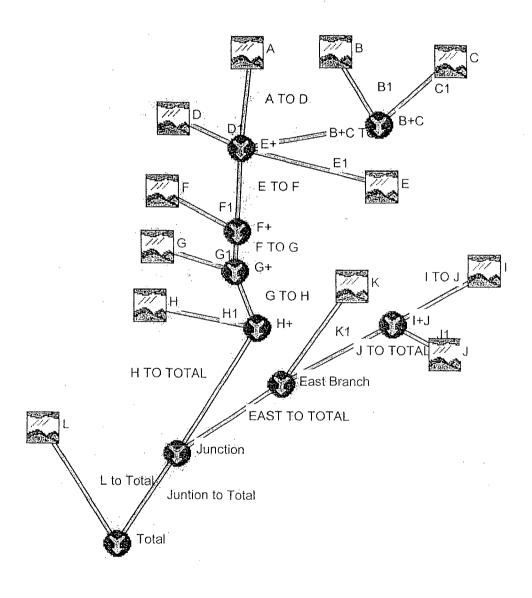
CENTROID MARKER THALWAG BASIN BOUNDARY





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HMS * Summary of Results

Project : PVR Run Name : Run 1

Start of Run : 03Jul04 0000 Basin Model : Existing Watershed

End of Run : 04Jul04 1200 Met. Model : 100-YEAR Execution Time : 22Jul04 1648 Control Specs : control

Hydrologic	Discharge	Time of	Volume	Drainage	
Element	Peak	Peak	(ac	Area	
	(cfs)		ft)	(sq mi)	
	409.23	03 Jul 04 1600	73.786	0.233	
to Total	409.23	03 Jul 04 1600	73.786	0.233	
	676.21	03 Jul 04 1600	121.50	0.407	
1	676.21	03 Jul 04 1600	121.50	0.407	
	264.96	03 Jul 04 1600	40.305	0.192	
1	264.96	03 Jul 04 1600	40.305	0.192	
	457.95	03 Jul 04 1600	77.656	0.277	
1	457.95	03 Jul 04 1600	77.656	0.277	
	341.81	03 Jul 04 1600	57.423	0.219	
1	341.81	03 Jul 04 1600	57.423	0.219	
	1074.9	03 Jul 04 1606	207.30	0.756	
TO D	1071.3	03 Jul 04 1610	207.30	0.756	
	156.13	03 Jul 04 1602	27.150	0.099	
1	156.13	03 Jul 04 1602	27.150	0.099	
	834.49	03 Jul 04 1606	158.64	0.619	
	834.49	03 Jul 04 1606	158.64	0.619	
+C	981.27	03 Jul 04 1606	185.79	0.718	
+C TO D	976.23	03 Jul 04 1618	185.79	0.718	
1	915.62	03 Jul 04 1612	188.50	0.789	
1	915.62	03 Jul 04 1612	188.50	0.789	
·+	3093.9	03 Jul 04 1612	639.02	2.482	
TO F	3082.8	03 Jul 04 1616	639.00	2.482	
'+	3220.0	03 Jul 04 1614	716.66	2.759	
TO G	3217.3	03 Jul 04 1616	716.66	2.759	
+	3293.7	03 Jul 04 1614	756.96	2.951	
TO H	3277.3	03 Jul 04 1620	756.85	2.951	
+	3489.6	03 Jul 04 1618	878.35	3.358	
TO TOTAL	3489.6	03 Jul 04 1618	878.35	3.358	
	118.23	03 Jul 04 1600	21.654	0.067	
1	118.23	03 Jul 04 1600	21.654	0.067	
	391.70	03 Jul 04 1600	60.609	0.274	
1	391.70	03 Jul 04 1600	60.609	0.274	
	421.73	03 Jul 04 1608	77.421	0.350	
TO J	420.57	03 Jul 04 1614	77.425	0.350	
+J	730.09	03 Jul 04 1604	138.03	0.624	
TO TOTAL	728.23	03 Jul 04 1606	138.04	0.624	
ast Branch	816.29	03 Jul 04 1604	159.69	0.691	
AST TO TOTAL	816.29	03 Jul 04 1604	159.69	0.691	
unction	4092.7	03 Jul 04 1614	1038.0	4.049	
untion to Total	4089.4	03 Jul 04 1614	1038.0	4.049	
otal	4156.4	03 Jul 04 1614	1111.8	4.282	

Existing_Watershed Basin: Existing Watershed Description: Existing Watershed Last Modified Date: 22 July 2004 Last Modified Time: 16:47:38 version: 2.2.2 Default DSS File Name: H:\PDATA\25100796\Calcs\STRMWATER\HMS\PVR\PVR.dss Unit System: English End: Subbasin: A Description: BASIN A-1 Canvas X: -373.438 Canvas Y: 1551.537 Label X: 16 Label Y: 0 Area: 0.7559 Downstream: A TO D LossRate: SCS Percent Impervious Area: 0 Curve Number: 84 Initial Abstraction: 0.38 Transform: SCS Lag: 17.900000 Baseflow: None End: Subbasin: D Canvas X: -469.497 Canvas Y: 1467.279 Label X: 16 Label Y: 0 Area: 0.219 Downstream: D1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 82 Initial Abstraction: 0.44 Transform: SCS Lag: 9.600000 Baseflow: None End: Reach: A TO D Canvas X: -380.772 Canvas Y: 1430.529 From Canvas X: -368.549 From Canvas Y: 1545.425 Label X: 16 Label Y: 0 Downstream: E+ Route: Muskingum Cunge Standard Length: 2705 Energy Slope: 0.0425 Shape: PRISM Width: 10

Page 1

Side Slope: 2

Existing_Watershed

Mannings n: 0.1 End: Junction: E+ Canvas X: -380.772 Canvas Y: 1430.529 Label X: 16 Label Y: 0 Downstream: E TO F End: Reach: D1 Canvas X: -380.772 Canvas Y: 1430.529 From Canvas X: -468.250 From Canvas Y: 1470.639 Label X: 16 Label Y: 0 Downstream: E+ Route: None End: Subbasin: B Canvas X: -258.910 Canvas Y: 1553.532 Label X: 16 Label Y: 0 Area: 0.099 Downstream: B1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 84 Initial Abstraction: 0.38 Transform: SCS Lag: 11.000000 Baseflow: None End: Subbasin: C Canvas X: -109.902 Canvas Y: 1542.290 Label X: 16 Label Y: 0 Area: 0.619 Downstream: C1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 81 Initial Abstraction: 0.47 Transform: SCS Lag: 18.600000 Baseflow: None End:

Junction: B+C

Canvas X: -203.161

Page 2

Existing_Watershed.

Canvas Y: 1460.187 Label X: 16 Label Y: 0 Downstream: B+C TO D End: Reach: B1 Canvas X: -203.161 Canvas Y: 1460.187 From Canvas X: -256.369 From Canvas Y: 1547.600 Label X: 16 Label Y: 0 Downstream: B+C Route: None End: Reach: C1 Canvas X: -203.161 Canvas Y: 1460.187 From Canvas X: -110.048 From Canvas Y: 1542.849 Label X: 16 Label Y: 0 Downstream: B+C Route: None End: Reach: B+C TO D Canvas X: -380.772 Canvas Y: 1430.529 From Canvas X: -203.161 From Canvas Y: 1460.187 Label X: 16 Label Y: 0 Downstream: E+ Route: Muskingum Cunge Standard Length: 6781 Energy Slope: 0.0354 Shape: PRISM Width: 10 Side Slope: 2 Mannings n: 0.1 End: Subbasin: E Canvas X: -199.058 Canvas Y: 1381.459 Label X: 16 Label Y: 0 Area: 0.789 Downstream: E1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 78 Initial Abstraction: 0.56 Transform: SCS

Lag: 24.700000

Existing_Watershed

Baseflow: None End: Reach: E1 Canvas X: -380.772 Canvas Y: 1430.529 From Canvas X: -192.710 From_Canvas Y: 1384.176 Label X: 16 Label Y: 0 Downstream: E+ Route: None End: Junction: F+ Canvas X: -386.783 Canvas Y: 1322.779 Label X: 16 Label Y: 0 Downstream: F TO G End: Reach: E TO F Canvas X: -386.783 Canvas Y: 1322.779 From Canvas X: -380.772 From Canvas Y: 1430.529 Label X: 16 Label Y: 0 Downstream: F+ Route: Muskingum Cunge Standard Length: 2365 Energy Slope: 0.0254 Shape: PRISM width: 10 Side Slope: 2 Mannings n: 0.1 End: Subbasin: F Canvas X: -483.452 Canvas Y: 1374.675 Label X: 16 Label Y: 0 Area: 0.277 Downstream: F1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 85 Initial Abstraction: 0.35 Transform: SCS Lag: 7.100000 Baseflow: None End: Reach: F1

Canvas X: -386.783

Canvas Y: 1322.779 From Canvas X: -483.452 From Canvas Y: 1376.575 Label X: 16 Label Y: 0 Downstream: F+ Route: None End: Junction: G+ Canvas X: -390.004 Canvas Y: 1271.922 Label X: 16 Label Y: 0 Downstream: G TO H End: Reach: F TO G Canvas X: -390.004 · Canvas Y: 1271.922 From Canvas X: -386.783 From Canvas Y: 1322.779 Label X: 16 Label Y: 0 Downstream: G+ Route: Muskingum Cunge Standard Length: 2098 Energy Slope: 0.0334 Shape: PRISM Width: 10 Side Slope: 2 Mannings n: 0.1 End: Subbasin: G Canvas X: -490.357 Canvas Y: 1302.854 Label X: 16 Label Y: 0 Area: 0.192 Downstream: G1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 73 Initial Abstraction: 0.74 Transform: SCS Lag: 7.500000 Baseflow: None End: Reach: G1 Canvas X: -390.004 Canvas Y: 1271.922 From Canvas X: -491.053 From Canvas Y: 1304.364 Label X: 16 Label Y: 0 Downstream: G+

```
Route: None
End:
Junction: H+
      Canvas X: -361.516
Canvas Y: 1201.009
Label X: 16
Label Y: 0
      Downstream: H TO TOTAL
End:
Reach: G TO H
      Canvas X: -361.516
       Canvas Y: 1201.009
       From Canvas X: -390.004
      From Canvas Y: 1271.922
Label X: 16
Label Y: 0
       Downstream: H+
       Route: Muskingum Cunge Standard
       Length: 4057
      Energy Slope: 0.00863
Shape: PRISM
Width: 10
Side Slope: 2
       Mannings n: 0.06
End:
Subbasin: H
      Canvas X: -499.604
Canvas Y: 1227.403
Label X: 16
Label Y: 0
       Area: 0.407
       Downstream: H1
       LossRate: SCS
       Percent Impervious Area: 0
       Curve Number: 88
       Initial Abstraction: 0.27
       Transform: SCS
       Lag: 10.100000
       Baseflow: None
End:
Reach: H1
       Canvas X: -361.516
Canvas Y: 1201.009
       From Canvas X: -500.554
       From Canvas Y: 1228.353
       Label X: 16
Label Y: 0
       Downstream: H+
       Route: None
End:
Subbasin: I
       Canvas X: -66.643
```

Existing_Watershed Canvas Y: 1274.085 Label X: 16 Label Y: 0 Area: 0.350 Downstream: I TO J LossRate: SCS Percent Impervious Area: 0.0 Curve Number: 75 Initial Abstraction: 0.67 Transform: SCS Lag: 19.400000 Baseflow: None Junction: I+J Canvas X: -185.605 Canvas Y: 1204.870 Label X: 16 Label Y: 0 Downstream: J TO TOTAL Reach: I TO J Canvas X: -185.605 Canvas Y: 1204.870 From Canvas X: -68.806 From Canvas Y: 1269.759 Label X: -10 Label Y: 15 Downstream: I+J Route: Muskingum Cunge Standard Length: 4592 Energy Slope: 0.0653 Shape: PRISM Width: 10 Side Slope: 2 Mannings n: 0.06 Subbasin: J Canvas X: -118.137 Canvas Y: 1166.476 Label X: 15 Label Y: 0 Area: 0.274 Downstream: J1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 75 Initial Abstraction: 0.67

Lag: 7.600000 Baseflow: None

Transform: SCS

End:

End:

End:

End:

Reach: J1

Canvas X: -185.605 Canvas Y: 1204.870 From Canvas X: -120.717 From Canvas Y: 1172.426 Label X: 16 Label Y: 0 Downstream: I+J Route: None End: Subbasin: K Canvas X: -238.598 Canvas Y: 1253.537 Label X: 16 Label Y: 0 Area: 0.067 Downstream: K1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 92 Initial Abstraction: 0.17 Transform: SCS Lag: 5.400000 Baseflow: None End: Junction: East Branch Canvas X: -328.386 Canvas Y: 1128.613 Label X: 15 Label Y: -1 Downstream: EAST TO TOTAL End: Reach: J TO TOTAL Canvas X: -328.386 Canvas Y: 1128.613 From Canvas X: -185.605 From Canvas Y: 1204.870 Label X: 16 Label Y: 0 Downstream: East Branch Route: Muskingum Cunge Standard Length: 1805 Energy Slope: 0.0249 Shape: PRISM Width: 10 Side Slope: 2 Mannings n: 0.06 End: Reach: K1 Canvas X: -328.386 Canvas Y: 1128.613 From Canvas X: -238.598 From Canvas Y: 1253.537 Label X: 16 Label Y: 0

Downstream: East Branch Route: None End: Junction: Junction Canvas X: -462.862 Canvas Y: 1037.872 Label X: 16 Label Y: 0 Downstream: Juntion to Total End: Reach: EAST TO TOTAL Canvas X: -462.862 Canvas Y: 1037.872 From Canvas X: -328.386 From Canvas Y: 1128.613 Label X: 16 Label Y: 0 Downstream: Junction Route: None End: ' Reach: H TO TOTAL Canvas X: -462.862 Canvas Y: 1037.872 From Canvas X: -361.516 From Canvas Y: 1201.009 Label X: -70 Label Y: 11 Downstream: Junction Route: None End: Subbasin: L Canvas X: -636.743 Canvas Y: 1069.776 Label X: 16 Label Y: 0 Area: 0.233 Downstream: L to Total LossRate: SCS Percent Impervious Area: 0.0 Curve Number: 91 Initial Abstraction: 0.2 Transform: SCS Lag: 2.900000 Baseflow: None End: Junction: Total Canvas X: -539.433 Canvas Y: 921.419 Label X: 16 Label Y: 0 End:

```
Reach: Juntion to Total
Canvas X: -539.433
Canvas Y: 921.419
       From Canvas X: -462.862
From Canvas Y: 1037.872
Label X: 16
Label Y: 0
       Downstream: Total
       Route: Muskingum Cunge Standard
Length: 1790
       Energy Slope: 0.011
Shape: PRISM
Width: 10
       Side Slope: 2
Mannings n: 0.035
End:
Reach: L to Total
       Canvas X: -539.433
Canvas Y: 921.419
       From Canvas X: -635.148
From Canvas Y: 1071.372
Label X: 16
Label Y: 0
       Downstream: Total
       Route: None
End:
Default Attributes:
        Default Basin Unit System: English
       Default Meteorology Unit System: SI
Default Loss Rate: SCS
        Default Transform: SCS
        Default Baseflow: None
       Default Route: Muskingum Cunge Standard Enable Flow Ratio: No
        Enable Evapotranspiration: No
        Compute Local Flow At Junctions: Yes
        Missing Flow To Zero: No
End:
```



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CHECKED BY	DATE	
SCALE.	•	

Lag Calcs

Basin

A

Corps Ti = 24 Ti ((LxLc)/51/2) for S.D. Lounty M= 0.38 (June 2003 hydrology

L= 1.255 mi L = 0.621 m.

$$S = \frac{2150 - 1115}{1.255} = 824.7 \frac{ft}{mi}$$

n= 0.06

$$T_i = 24(0.06) \left[(1.255)(0.621) / (824.7)^{1/2} \right]^{0.38}$$

Tp= 0.862 T;

NRCS Ti = Tp - D/2

D should be a 0.27p = 3,8 okay

NRCS T; = 18,9 - 1 = 17.9 min



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JOB 25-100796	
SHEET NO. 2	OF
CALCULATED BY RPH	DATE 7/1/04
CHECKED BY	DATE
SCALE	

Basin B.

L= 0.725 mi
L= 0.386 mi
S=
$$\frac{2085-1240}{0.725}$$
 = 1165.5 ft/mi
 \vec{n} = 0.06

Corps
$$T_i = 24(0.08 \left[(0.725)(0.386) / (1165.5)^{1/2} \right]^{0.38}$$

Corps $T_i = 0.232 \text{ his} = 139 \text{ min}$
 $T_p = 0.862 (13.9) = 12.0 \text{ min}$
NRCS $T_i = 12.0 - 1 = 11.0 \text{ min}$

Basin (

$$L_{c} = 1.247 \text{ mi}$$

$$L_{c} = 0.652 \text{ mi}$$

$$S = \frac{2180 - 1240}{1.247} = 753.8 \text{ ft/mi}$$

$$\bar{n} = 0.06$$

$$T_{i} = 24(0.06) \left[\frac{(1.247)(0.652)}{(753.8)^{1/2}} \right]^{0.38}$$

$$T_{i} = 0.378 \text{ hrs} = 27.7 \text{ min}$$

$$T_{p} = 22.7 (0.862) = 19.6 \text{ min}$$

$$NRCS T_{i} = 19.6 - 1 = 18.6 \text{ min}$$



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SHEET NO3	_ OF
CALCULATED BY RPH	_ DATE
CHECKED BY	DATE
SCALE	

Basin D

Basin E

$$S = \frac{2140 - 1000}{1.702} = 669.8 \text{ ft/m}$$

$$\bar{n} = 0.06$$



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JOB 25-100796	
SHEET NO.	OF
CALCULATED BY RPH	DATE 7/1/04
CHECKED BY	DATE
SCALE	

Basin F

$$\tilde{n} = 0.03$$

Corps
$$T_i = 24(0.03) \left[(0.909)(0.366) / (341)^{1/2} \right]^{0.35}$$

Basin G

$$S = \frac{1180 - 870}{0.940} = 329.8 ft/mi$$

$$\bar{0} = 0.03$$

NRCS
$$T_i = 8.5 - \frac{2}{2} = 7.5 min$$



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JOB 25-100-196	
SHEET NO5	_ OF
CALCULATED BY RP1+	DATE 4/1/04
CHECKED BY	DATE

Basin H

$$L = 1.235m'$$

$$L = 0.556m'$$

$$S = \frac{1180 - 835}{1.235} = 279.4 f/m'$$

$$\bar{n} = 0.03$$

$$T = 24(2.2) \left[(1.235)(0.55) \right]$$

Basin I

$$S = \frac{2180 - 1180}{1.256} = 796.2 ft/m;$$

$$\overline{n} = 0.06$$

 $Corps T_i = 24(0.06) \left[\frac{(1.256)(0.742)}{(796.2)^{1/2}} \right]^{0.38}$

NRCS
$$T_i = 20.4 - \frac{2}{7} = 19.4 \text{ min}$$



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JOB 25-100796	
SHEET NO6	OF
CALCULATED BY RPH	DATE 7/104
CHECKED BY	DATE
SCALE	

Basin J

L= 0.766 m;

$$L_c = 0.432 \text{ m}$$
;
 $S = \frac{1300 - 880}{0.766} = 548.3 \text{ f/m}$;

 $\bar{n} = 0.035$

Basin K

$$S = \frac{1050 - 835}{0.605} = 355.4 \text{ ft/m}$$

$$\bar{n} = 0.03$$



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JOB	100 796		
SHEET NO	6	of	
CALCULATED BY _	RPH	DATE 7/2/04	
CHECKED BY		DATE	
SCALE			

Bosin L

L= 0.339 m;

$$L_c = 0.058m$$
;
 $S = \frac{835-815}{0.339} = 59.0$ f⁴/mi

$$\overline{N} = 0.03$$
Corps $T_i = 24(0.03) \left[(0.339)(0.058) / (59)^{1/2} \right]^{0.38}$

NRCS
$$T_i = 3.9 - \frac{2}{2} = 2.9 \text{ min}$$

Section: Page:

Appendix D 2 of 3

WORKSHEET 4-2

(name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A;/A	PARTIAL CN ₂ CN ₂ x A _i /A
Sagebrush (SB)	. 9000	В	35	0.12	4.2
Broadleaf (hoporral (BC)	300d	В	57	0.03	1.7
5B	good	С	47	0.20	9.4
BC	good	C	71	0.02	1.4
1-acre		С	80	0.35	28.0
½ acre		D	85	0.15	12.8
ROW Crops (RC)	poor	С	84	0,08	6.7
Woodland- grass (wb)	good	C	72	0.05	3,6
Sums = 1.000					

Sums = 1.000

For entire basin $CN_2 =$

Section: Page: Appendix D 2 of 3

WORKSHEET 4-2

Rasin B (name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A
5B	good	С	47	0.15	7.1
BC	good	C	71	0.15	10,6
Woodland- grass (WG)	god	С	72	0.02	1.4
1-acre		C	79	0.53	41.9
1-our		D	84	0.05	4.2
5B	900d	В	35	0.08	2.8
Вс	good	В	57	0.02	1,1

Sums = 1.000

For entire basin $CN_2 = 69.7$

Section: Page:

Appendix D 2 of 3

WORKSHEET 4-2

Basin C (name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A
1-acre		В	68	0.10	6.8
Orchards (OR)	good	C	72	0,10	7.2
1-acre		D	84	0.05	4,2
BC	goar	B	57	0,45	25.7
BC	9000	С	71	0,10	7.1
SB	god	8	35	0,05	1.8
OR	good	В	58	0.05	2.9
1-acre		C	79	0.10	7.9
		·	Cuma :-	1.000	

Sums ≔ 1.000

For entire basin $CN_2 = 63.6$

Section: Page:

Appendix D 2 of 3

WORKSHEET 4-2

Basin (name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A;/A	PARTIAL CN ₂ CN ₂ x A _i /A
1/2-aue		В	70	0,10	7.0
5B	good	B	35	0.02	0.7
5B	good	С	47	0,40	18.8
W6	5001	C	72	80.0	5,8
½-acre		С	80	0.18	14.4
1-0de		D	85	0.20	17.0
WG-	900d	В	58	0.02	1.2
			C.,,,,,	1 000	

1.000 Sums =

For entire basin $CN_2 = 64.9$

San Diego County Hydrology Manual

Date: June 2003

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WORKSHEET 4-2

Basin E (name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6		
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A;/A	PARTIAL CN ₂ CN ₂ x A _i /A		
ВС	9000	В	57	0.58	33.1		
5B	300d	В	35	0.05	1.8		
1-acre		В	68	0.10	6,8		
W6	300d	В	58	0,04	2.3		
1-acre		С	79	0.15	10.7		
BC	9000	C	71	0.02	1.4		
WG	900d	С	72	0.03	2.2		
SB	9020	<u></u>	47	0.03	1,4		
	Suma — 1 000						

Sums = 1.000

For entire basin $CN_2 = 59.7$

Section: Page:

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WORKSHEET 4-2

Rosin F
(name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A
1-acre		В	70	0.30	21.0
1/2 acre		C	80	0.10	8,0
Orchards	Fair	С	77	0.05	3.9
ВС	Fair	В	63	0.31	19,5
W6	Foir	В	65	0.08	5,2
SB	For	В	51	0,03	1.5
SB	Fair	C	63	0,03	1.9
				·	
zaue		D	85	0.10	8,5

Sums =1.000

For entire basin $CN_2 = _69.5$

Section: Page:

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WORKSHEET 4-2

Rasin 6 (name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6		
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A		
5B	2000	В	35	0.25	8.8		
WG-	9000	В	58	0.05	2.9		
ВС	sood	В	57	0.15	8.6		
Orchard	fair	В	65	0.05	3.2		
5B	9000	С	47	0.17	8,0		
1/2-acre		С	80	0.20	16,0		
W6-	300d	A	33	0.05	1.7		
Orchard	foir	C	77	0,08	6.2		
	Sums = 1 000						

Sums = 1.000

For entire basin $CN_2 = __55.4$

Section: Page: Appendix D 2 of 3

WORKSHEET 4-2

(name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A
WG	fair	A	44	0.05	2.2
1- acre		C	79	0.35	27,7
W6	fair	С	77	0.05	3.9
5B	fair	C	63	0.15	9.4
Row Crops	poor	С	84	0.35	29,4
5B	fair	В	51	0.03	1.5
Вс	fair	В	63	0.02	1.3

Sums = 1.000

For entire basin $CN_2 = _75.4$

Section: Page:

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WORKSHEET 4-2

Basin I
(name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6			
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A			
BC	g00d	В	57	0.78	44.5			
5B	Good	В	35	0.05	1.8			
SB	9000	D	55	0.05	2.8			
WG	9000	В	58	0.05	2.9			
Вс	9000	C	71	0.03	2.1			
WG-	good	С	72	0,02	1.4			
2-acre		В	77	0.02	1.5			
	0 1000							

Sums = 1.000

For entire basin $CN_2 = _57.0$

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WORKSHEET 4-2

Basin J (name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A
5B	Good	В	35	0,33	11.6
Вс	9000	B	57	0.15	8,6
WG	fair	C	77	0.05	3.8
WG	foir	В	65	0.15	9,8
2-ocre		D	82	0.05	4.1
2-oure		В	65	0.10	6.5
2-ocre		C	77	0.02	1,5
SB	fair	D	70	0.02	1,5
W6-	fair	D	82	0.03	2.5

Rangeland fair $\frac{\text{Sums} = 1.000}{\text{For entire basin CN}_2 = \frac{9}{2}}$ 0.02 1.6 Rangeland fair B 69 0.08 5.5

Section: Page:

Appendix D 2 of 3

WORKSHEET 4-2

(name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

	T .			Γ	
column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A
RC	poor	C	84	0,50	42.0
RC	Poor	B	79	0.05	4.0
2-acre		C	77	0.05	3.8
2-acre		D	82	0.25	20.5
5B	fair	С	63	0.05	3.2
W6	fair	D	82	0,05	4.1
RC	Poor	D	88	0.05	4.4
			Sums =	1.000	

For entire basin $CN_2 = 82.0$

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WORKSHEET 4-2

Rasin L (name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6		
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A;/A	PARTIAL CN ₂ CN ₂ x A _i /A		
WG	fair	В	65	0.05	3,3		
RC	Poor	В	79	0.05	3.9		
RC	poor	С	84	0,45	37.8		
5B	fair	С	63	0.15	9.5		
RC	Poor	Q	88	0.10	8.8		
5B	fair	D	70	0.05	3,5		
2-our		D.	82	0.15	12.3		
0 1 000							

Sums = 1.000

For entire basin $CN_2 = __79.1$



PLANNING **B** DESIGN **B** CONSTRUCTION 800.479.3808 • www.RBF.com

JOB 25-100796	
SHEET NO.	_ of1
CALCULATED BY RPH	DATE 7/1/04
CHECKED BY	DATE
SCALE	

because we are determining the 100-yr peak flows we need to adjust the CN to PZN=3 instead of PZN=2

CN(z)	CN (PZN=3)
68	84
69	84
64	81
65	82
60	78
70	85
55	73
75	88
57	75
82	92
79	91
81	92
78	90

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 $\label{table 4-11}$ RUNOFF CURVE NUMBERS AND CONSTANTS FOR THE CASE $I_A \text{=-}0.2S$

	S	Curve Starts Where P =		S	Curve Starts Where P =
CN	(inches)	(inches)	CN	(inches)	(inches)
100	0	0	60	6.67	1.33
99	.101	.02	59	9.95	1.39
98	.204	.04	58	7.24	1.45
97	.309	.06	57	7.54	1.51
96	.417	.08	56	7.86	1.57
95	.526	.11	55	8.18	1.64
94	.638	.13	54	8.52	1.70
93	.753	.15	53	8.87	1.77
92	.870	.17	52	9.23	1.85
91	.989	.20	51	9.61	1.92
90	1.11	.22	50	10.0	2.00
89	1.24	.25	49	10.4	2.08
88	1.36	.27	48	10.8	2.16
87	1.49	.30	47	11.3	2.26
86	1.63	.33	46	11.7	2.34
85	1.76	.35	45	12.2	2.44
84	1.90	.38	44	12.7	2.54
83	2.05	.41	43	13.2	2.64
82	2.20	.44	42	13.8	2.76
81	2.34	.47	41	14.4	2.88
80	2.50	.50	40	15.0	3.00
79	2.66	.53	39	15.6	3.12
78	2.82	.56	38	16.3	3.26
77	2.99	.60	37	17.0	3.40
76	3.16	.63	36	17.8	3.56
75	3.33	.67	35	18.6	3.72
74	3.51	.70	34	19.4	3.88
73	3.70	.74	33	20.3	4.06
72	3.89	.78	32	21.2	4.24
71	4.08	.82	31	22.2	4.44
70	4.28	.86	30	23.3	4.66
69	4:49	.90			
68	4.70	.94	25	30.0	6.00
67	4.92	.98	20	40.0	8.00
66	5.15	1.03	15	56.7	11.34
65	5.38	1.08	10	90.0	18.00
64	5.62	1.12	5	190.0	38.0
63	5.87	1.17	0	infinity	infinity
62	6.13	1.23			
61	6.39	1.28			

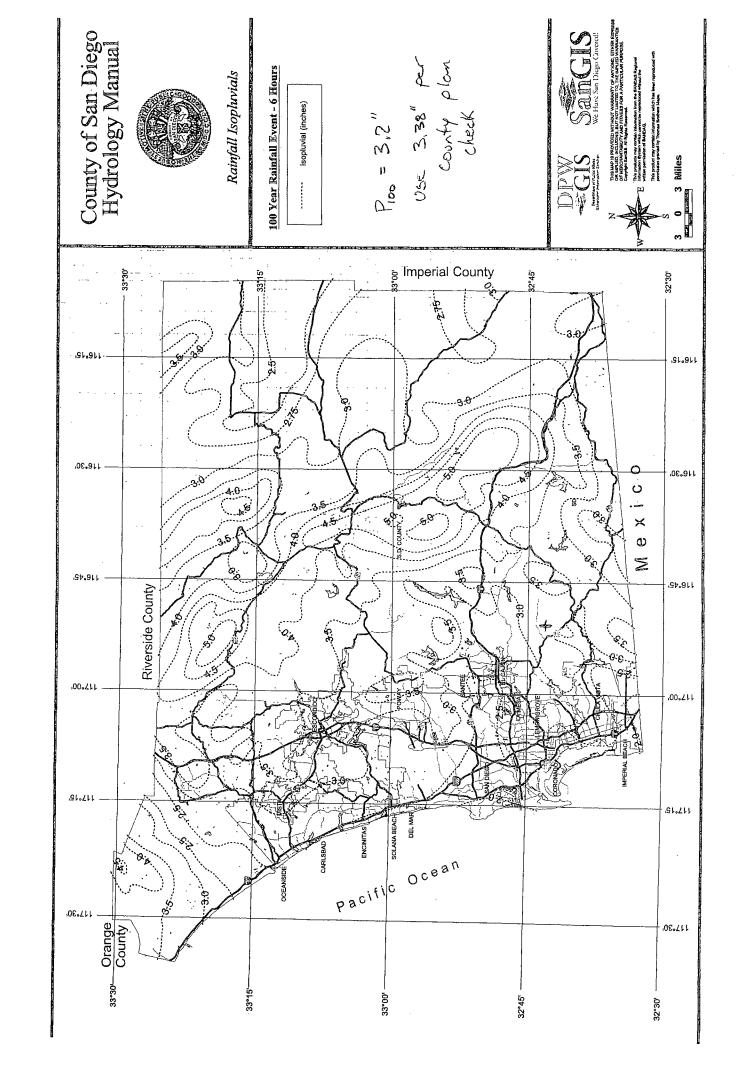
San Diego County Hydrology Manual
Date: June 2003

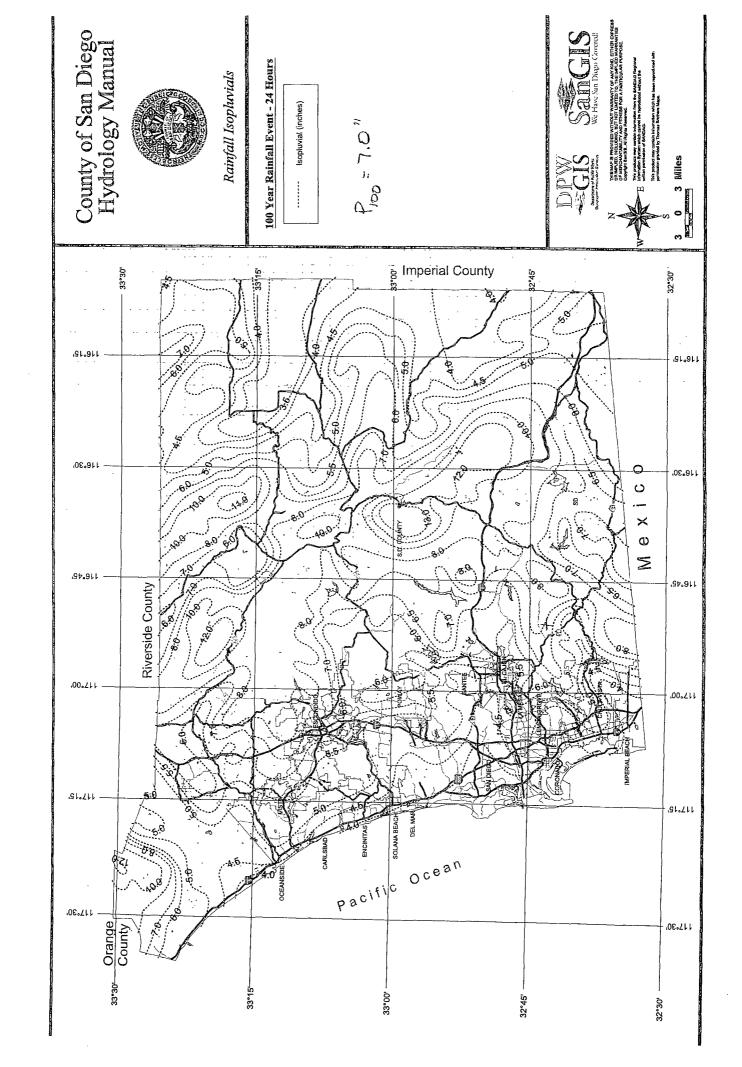
Section: 4
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Table 4-10

RUNOFF CURVE NUMBERS FOR PZN CONDITIONS 1.0, 2.0, AND 3.0

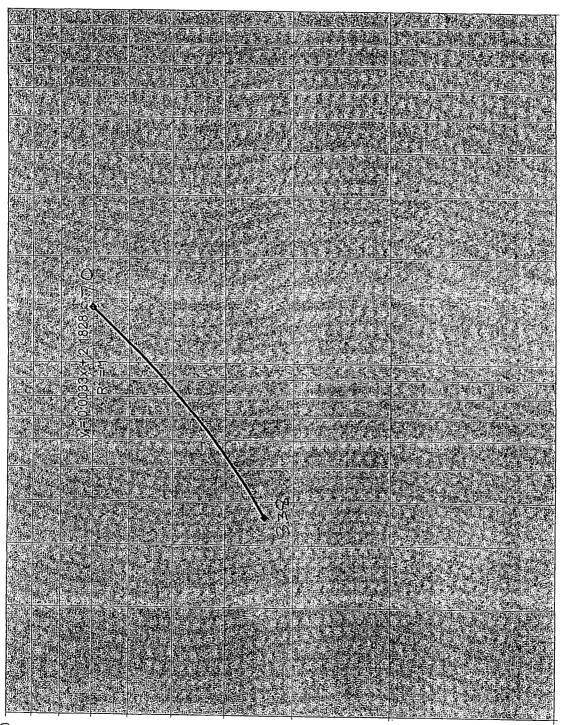
	CN For:			CN For:	
PZN	PZN	PZN	PZN	PZN	PZN
Condition =	Condition =	Condition =	Condition =	Condition =	Condition =
1.0	2.0	3.0	1.0	2.0	3.0
100	100	100	40	60	78
97	99	100	39	59	77
94	98	99	38	58	76
91	97	99	37	57	75
89	96	99	37	56	75
87	95	98	34	55	73
85	94	98	34	54	73
83	93	98	33	53	72
81	92	97	32	52	71
80	91	97	31	51	70
78	90	96	31	50	70
76	89	96	30	49	69
75	88	95	29	48	68
73	87	95	28	47	67
72	86	94	27	46	66
70	85	94	26	45	65
68	84	93	25	44	64
67	83	93	25	43	63
66	82	92	24	42	62
64	81	92	23	41	61
63	80	91	22	40	60
62	79	91	21	39	59
60	78	90	21	38	58
59	77	89	20	37	57
58	76	89	19	36	56
57	75	88	18	35	55
55	74	88	18	34	54
54	73	87	17	33	53
53	72	86	16	32	52
52	71	86	16	31	51
51	70	85	15	30	50
50	69	84			
48	68	84	12	25	43
47	67	83	9	20	37
46	66	82	6	15	30
45	65	82	4	10	22
44	64	81	2	5	13
43	63	80	0	0	0
42	62	79			
41	61	78			





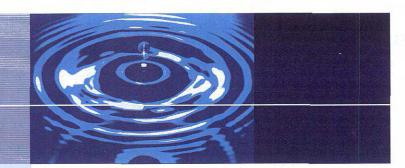
Nested Storm

P6(100) P24(100)	3.38 7			Depth (inches)		
		•	0	0		0.1642
			30	1.401898	1.401898	0.099
			60	1.793007	0.391109	0.099
		1	90	2.070592	0.277584	0.099
		2	120	2.293231	0.222639	0.099
		3	150	2.48228	0.189049	0.099
		4	180	2.648257	0.165977	0.099
		5	210	2.797217	0.148961	0.099
		6	240	2.933009	0.135791	0.099
		7	270	3.058247	0.125238	0.099
		8	300	3.1748	0.116554	0.099
		9	330	3.284058	0.109258	0.099
		10	360	3.387082	0.103024	0.099
		11	390	3.4698	0.082718	0.099
		12	420	3.5688	0.099	0.099
		13	450	3.6678	0.099	0.099
		14	480	3.7668	0.099	0.099
		15	510	3.8658	0.099	0.099
		16	540	3.9648	0.099	0.099
		17	570	4.0638	0.099	0.099
		18	600	4.1628	0.099	0.099
		19	630	4.2618	0.099	0.099
		20	660	4.3608	0.099	0.099
		21	690	4.4598	0.099	0.099
		22	720	4.5588	0.099	0.103024
		23	750	4.6578	0.099	0.109258
		24	780	4.7568	0.099	0.125238
		25	810	4.8558	0.099	0.135791
		26	840	4.9548	0.099	0.165977
		27	870	5.0538	0.099	0.189049
		28	900	5.1528	0.099	0.277584
		29	930	5.2518	0.099	0.391109
		30	960	5.3508	0.099	1.401898
		31	990	5.4498	0.099	0.222639
		32	1020	5.5488	0.099	0.148961
		33	1050	5.6478	0.099	0.116554
		34	1080	5.7468	0.099	0.082718
		35	1110	5.8458	0.099	0.099
		36	1140	5.9448	0.099	0.099
		37	1170	6.0438	0.099	0.099
		38	1200	6.1428	0.099	0.099
		39	1230	6.2418	0.099	0.099
		40	1260	6.3408	0.099	0.099
		41	1290	6.4398	0.099	0.099
		42	1320	6.5388	0.099	0.099
		43	1350	6.6378	0.099	0.099
		44	1380	6.7368	0.099	0.099
		45	1410	6.8358	0.099	0.099
		46	1440	7	0.1642	0.000
		47			0	ŭ



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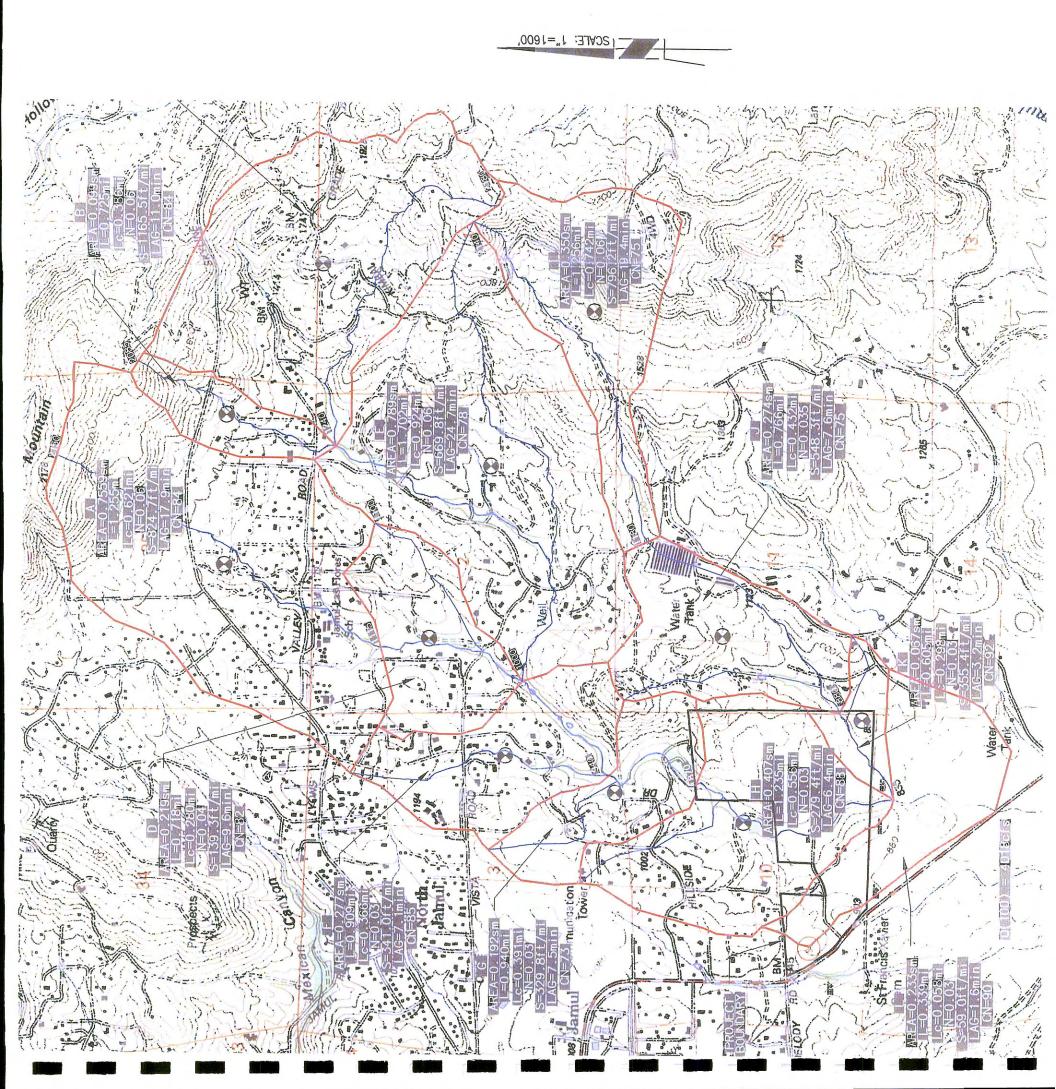
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APPENDIX B Proposed Conditions Hydrology

This Section Contains:

- Work Map
- HEC-HMS Schematic
- HEC-HMS Summary Output
- HEC-HMS Basin Input File
- Lag Time Calculations
- Curve Number Calculations



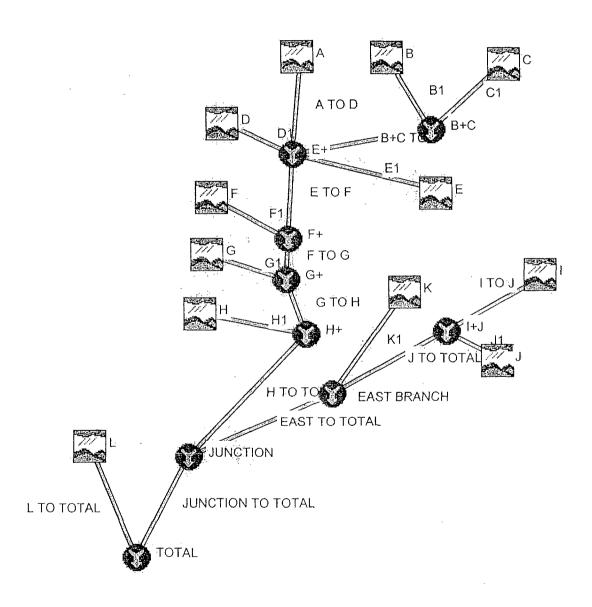
PEACEFUL VALLEY RANCH HYDROLOGY WORK MAP PROPOSED CONDITION

LEGEIND

CENTROID MARKER THALWAG BASIN BOUNDARY



LANNING B DESIGN B GONSTRUC 9755 CLAIREMONT MESA BOULEVARD, SUIT



HMS * Summary of Results

Project : PVR

Run Name : Run 2

Start of Run : 03Jul04 0000 Basin Model : Proposed Watershed

Execution Time : 04Jul04 1200 Met. Model : 100-YEAR

Execution Time : 22Jul04 1652 Control Specs : control

Hydrologic	Discharge	Time of	Volume	Drainage	
Element	Peak	Peak	(ac	Area	
	(cfs)		ft)	(sq mi)	
L	406.94	03 Jul 04 1600	72.404	0.233	
L L TO TOTAL H	406.94	03 Jul 04 1600	72.404	0.233	
H	695.28	03 Jul 04 1600	121.50	0.407	
н1	695.28	03 Jul 04 1600	121.50	0.407	
G	264.96	03 Jul 04 1600	40.305	0.192	
G G1	264.96	03 Jul 04 1600	40.305	0.192	
ম	457.95	03 Jul 04 1600	77.656	0.277	
F1 D	457.95	03 Jul 04 1600	77.656	0.277	
D	341.81	03 Jul 04 1600	57.423	0.219	
D1	341.81	03 Jul 04 1600	57.423	0.219	
Α .	1074.9	03 Jul 04 1606	207.30	0.756	
A TO D	1071.3	03 Jul 04 1610	207.30	0.756	
В	156.13	03 Jul 04 1602	27.150	0.099	
	156.13	03 Jul 04 1602	27.150	0.099	
B1 C	834.49	03 Jul 04 1606	158.64	0.619	
C1 ·	834.49	03 Jul 04 1606	158.64	0.619	
B+C	981.27	03 Jul 04 1606	185.79	0.718	
B+C TO D	976.23	03 Jul 04 1618	185.79	0.718	
E.	915.62	03 Jul 04 1612	188.50	0.789	
E1	915.62	03 Jul 04 1612	188.50	0.789	
E+	3093.9	03 Jul 04 1612	639.02	2.482	
E TO F	3082.8	03 Jul 04 1616	639.00	2.482	
⁷ +	3220.0	03 Jul 04 1614	716.66	2.759	
F TO G	3217.3	03 Jul 04 1616	716.66	2.759	
G+	3293.7	03 Jul 04 1614	756.96	2.951	
G TO H	3277.3	03 Jul 04 1620	756.85	2.951	
H+	3407.9	03 Jul 04 1620	878.35	3.358	
H TO TOTAL	3407.9	03 Jul 04 1620	878.35	3.358	
K	118.38	03 Jul 04 1600	21.654	0.067	
K1	118.38	03 Jul 04 1600	21.654	0.067	
J	391.70	03 Jul 04 1600	60.609	0.274	
J1	391.70	03 Jul 04 1600	60.609	0.274	
I I TO J	421.73	03 Jul 04 1608	77.421	0.350	
I TO J	420.57	03 Jul 04 1614	77.425	0.350	
I+J	730.09	03 Jul 04 1604	138.03	0.624	
J TO TOTAL	728.23	03 Jul 04 1606	138.04	0.624	
EAST BRANCH	796.96	03 Jul 04 1602	159.69	0.691	
EAST TO TOTAL	796.96	03 Jul 04 1602	159.69	0.691	
JUNCTION	3955.4	03 Jul 04 1618	1038.0	4.049	
JUNCTION TO TOTAL	3952.8	03 Jul 04 1618	1038.0	4.049	
TOTAL	4017.7	03 Jul 04 1618	1110.4	4.282	

Basin: Proposed Watershed Description: Existing Watershed Last Modified Date: 22 July 2004 Last Modified Time: 16:52:13 Version: 2.2.2 Default DSS File Name: H:\PDATA\25100796\Calcs\STRMWATER\HMS\PVR\PVR.dss Unit System: English End: Subbasin: A Description: BASIN A-1 Canvas X: -373.438 Canvas Y: 1551.537 Label X: 16 Label Y: 0 Area: 0.7559 Downstream: A TO D LossRate: SCS Percent Impervious Area: 0 Curve Number: 84 Initial Abstraction: 0.38 Transform: SCS Lag: 17.900000 Baseflow: None End: Subbasin: D Canvas X: -469.497 Canvas Y: 1467.279 Label X: 16 Label Y: 0 Area: 0.219 Downstream: D1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 82 Initial Abstraction: 0.44 Transform: SCS Lag: 9.600000 Baseflow: None End: Reach: A TO D Canvas X: -380.772 Canvas Y: 1430.529 From Canvas X: -368.549 From Canvas Y: 1545.425 Label X: 16 Label Y: 0 Downstream: E+ Route: Muskingum Cunge Standard Length: 2705 Energy Slope: 0.0425 Shape: PRISM Width: 10

Side Slope: 2

Mannings n: 0.1 End: Junction: E+ Canvas X: -380.772 Canvas Y: 1430.529 Label X: 16 Label Y: 0 Downstream: E TO F End: Reach: D1 Canvas X: -380.772 Canvas Y: 1430.529 From Canvas X: -468.250 From Canvas Y: 1470.639 Label X: 16 Label Y: 0 Downstream: E+ Route: None End: Subbasin: B Canvas X: -258.269 Canvas Y: 1549.500 Label X: 16 Label Y: 0 Area: 0.099 Downstream: B1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 84 Initial Abstraction: 0.38 Transform: SCS Lag: 11.000000 Baseflow: None End: Subbasin: C Canvas X: -109.902 Canvas Y: 1542.290 Label X: 16 Label Y: 0 Area: 0.619 Downstream: C1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 81 Initial Abstraction: 0.47 Transform: SCS Lag: 18.600000 Baseflow: None End: Junction: B+C

Canvas X: -203.161

Canvas Y: 1460.187 Label X: 16 Label Y: 0 Downstream: B+C TO D End: Reach: B1 Canvas X: -203.161 Canvas Y: 1460.187 From Canvas X: -256.369 From Canvas Y: 1547.600 Label X: 16 Label Y: 0 Downstream: B+C Route: None End: Reach: C1 Canvas X: -203.161 Canvas Y: 1460.187 From Canvas X: -110.048 From Canvas Y: 1542.849 Label X: 16 Label Y: 0 Downstream: B+C Route: None End: Reach: B+C TO D Canvas X: -380.772 Canvas Y: 1430.529 From Canvas X: -203.161 From Canvas Y: 1460.187 Label X: 16 Label Y: 0 Downstream: E+ Route: Muskingum Cunge Standard Length: 6781 Energy slope: 0.0354 Shape: PRISM Width: 10 Side Slope: 2 Mannings n: 0.1 End: Subbasin: E Canvas X: -197.502 Canvas Y: 1380.069 Label X: 16 Label Y: 0 Area: 0.789 Downstream: E1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 78 Initial Abstraction: 0.56 Transform: SCS Lag: 24.700000

```
Baseflow: None
End:
Reach: E1
      Canvas X: -380.772
Canvas Y: 1430.529
       From Canvas X: -192.710
From Canvas Y: 1384.176
       Label X: 16
       Label Y: 0
       Downstream: E+
       Route: None
End:
Junction: F+
       Canvas X: -386.783
Canvas Y: 1322.779
Label X: 16
       Label Y: 0
       Downstream: F TO G
End:
Reach: E TO F
       Canvas X: -386.783
       Canvas Y: 1322.779
       From Canvas X: -380.772
       From Canvas Y: 1430.529
       Label X: 16
Label Y: 0
       Downstream: F+
       Route: Muskingum Cunge Standard
       Length: 2365
       Energy Slope: 0.0254
Shape: PRISM
Width: 10
Side Slope: 2
Mannings n: 0.1
 End:
 Subbasin: F
       Canvas X: -483.452
Canvas Y: 1374.675
Label X: 16
Label Y: 0
        Area: 0.277
       Downstream: F1
        LossRate: SCS
        Percent Impervious Area: 0
        Curve Number: 85
        Initial Abstraction: 0.35
        Transform: SCS
        Lag: 7.100000
        Baseflow: None
 End:
 Reach: F1
```

Canvas X: -386.783

Canvas Y: 1322.779 From Canvas X: -483.452 From Canvas Y: 1376.575 Label X: 16 Label Y: 0 Downstream: F+ Route: None End: Junction: G+ Canvas X: -390.004 Canvas Y: 1271.922 Label X: 16 Label Y: 0 Downstream: G TO H End: Reach: F TO G Canvas X: -390.004 Canvas Y: 1271.922 From Canvas X: -386.783 From Canvas Y: 1322.779 Label X: 16 Label Y: 0 Downstream: G+ Route: Muskingum Cunge Standard Length: 2098 Energy Slope: 0.0334 Shape: PRISM Width: 10 Side Slope: 2 Mannings n: 0.1 End: Subbasin: G Canvas X: -490.357 Canvas Y: 1302.854 Label X: 16 Label Y: 0 Area: 0.192 Downstream: G1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 73 Initial Abstraction: 0.74 Transform: SCS Lag: 7.500000 Baseflow: None End: Reach: G1 Canvas X: -390.004 Canvas Y: 1271.922 From Canvas X: -491.053 From Canvas Y: 1304.364 Label X: 16 Label Y: 0 Downstream: G+

1

```
Route: None
End:
Junction: H+
      Canvas X: -363.970
Canvas Y: 1202.236
Label X: 16
Label Y: 0
       Downstream: H TO TOTAL
End:
Reach: G TO H
       Canvas X: -363.970
       Canvas Y: 1202.236
       From Canvas X: -390.004
From Canvas Y: 1271.922
Label X: 16
Label Y: 0
       Downstream: H+
       Route: Muskingum Cunge Standard
       Length: 4057
       Energy Slope: 0.00863
Shape: PRISM
Width: 10
Side Slope: 2
Mannings n: 0.06
 End:
 Subbasin: H
       Canvas X: -499.604
Canvas Y: 1227.403
Label X: 16
Label Y: 0
        Area: 0.407
        Downstream: H1
        LossRate: SCS
        Percent Impervious Area: 0
Curve Number: 88
        Initial Abstraction: 0.27
        Transform: SCS
        Lag: 6.400000
        Baseflow: None
 End:
 Reach: H1
        Canvas X: -363.970
        Canvas Y: 1202.236
        From Canvas X: -500.554
        From Canvas Y: 1228.353
      Label X: 16
Label Y: 0
        Downstream: H+
        Route: None
 End:
 Subbasin: I
```

Canvas X: -66.315

Proposed_Watershed Canvas Y: 1275.875 Label X: 16 Label Y: 0 Area: 0.350 Downstream: I TO J LossRate: SCS Percent Impervious Area: 0.0 Curve Number: 75 Initial Abstraction: 0.67 Transform: SCS Lag: 19.400000 Baseflow: None End: Junction: I+J Canvas X: -185.605 Canvas Y: 1204.870 Label X: 16 Label Y: 0 Downstream: J TO TOTAL End: Reach: I TO J Canvas X: -185.605 Canvas Y: 1204.870 From Canvas X: -68.806 From Canvas Y: 1269.759 Label X: -10 Label Y: 15 Downstream: I+J Route: Muskingum Cunge Standard Length: 4592 Energy Slope: 0.0653 Shape: PRISM Width: 10 Side Slope: 2 Mannings n: 0.06 End: Subbasin: J Canvas X: -120.091 Canvas Y: 1168.324 Label X: 15 Label Y: 0 Area: 0.274 Downstream: J1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 75 Initial Abstraction: 0.67 Transform: SCS Lag: 7.600000 Baseflow: None End:

Reach: J1

Canvas X: -185.605 Canvas Y: 1204.870 From Canvas X: -120.717 From Canvas Y: 1172.426 Label X: 16 Label Y: 0 Downstream: I+J Route: None End: Subbasin: K Canvas X: -238.598 Canvas Y: 1253.537 Label X: 16 Label Y: 0 Area: 0.067 Downstream: K1 LossRate: SCS Percent Impervious Area: 0 Curve Number: 92 Initial Abstraction: 0.17 Transform: SCS Lag: 3.200000 Baseflow: None End: Junction: EAST BRANCH Canvas X: -330.840 Canvas Y: 1126.159 Label X: 21 Label Y: -6 Downstream: EAST TO TOTAL End: Reach: J TO TOTAL Canvas X: -330.840 Canvas Y: 1126.159 From Canvas X: -185.605 From Canvas Y: 1204.870 Label X: 16 Label Y: 0 Downstream: EAST BRANCH Route: Muskingum Cunge Standard Length: 1805 Energy Slope: 0.0249 Shape: PRISM Width: 10 Side Slope: 2 Mannings n: 0.06 End: Reach: K1 Canvas X: -330.840 Canvas Y: 1126.159 From Canvas X: -238.598 From_Canvas Y: 1253.537 Label X: 16 Label Y: 0

Downstream: EAST BRANCH Route: None End: Junction: JUNCTION Canvas X: -513.681 Canvas Y: 1046.539 Label X: 16 Label Y: 0 Downstream: JUNCTION TO TOTAL End: Reach: H TO TOTAL Canvas X: -513.681 Canvas Y: 1046.539 From Canvas X: -363.970 From Canvas Y: 1202.236 Label X: 16 Label Y: 0 Downstream: JUNCTION Route: None End: Reach: EAST TO TOTAL Canvas X: -513.681 Canvas Y: 1046.539 From Canvas X: -330.840 From Canvas Y: 1126.159 Label X: 16 Label Y: 0 Downstream: JUNCTION Route: None End: Subbasin: L Canvas X: -639.439 Canvas Y: 1059.115 Label X: 16 Label Y: 0 Area: 0.233 Downstream: L TO TOTAL LossRate: SCS Percent Impervious Area: 0.0 Curve Number: 90 Initial Abstraction: 0,22 Transform: SCS Lag: 1.600000 Baseflow: None End: Junction: TOTAL Canvas X: -579.704 Canvas Y: 919.209 Label X: 16 Label Y: 0

End:

Proposed_Watershed Reach: JUNCTION TO TOTAL Canvas X: -579.704 Canvas Y: 919.209 From Canvas X: -513.681 From Canvas Y: 1046.539 Label X: 16 Label Y: 0 Downstream: TOTAL Route: Muskingum Cunge Standard Length: 1790 Energy Slope: 0.011 Shape: PRISM Width: 10 Side Slope: 2 Mannings n: 0.035 End: Reach: L TO TOTAL Canvas X: -579.704 Canvas Y: 919.209 From Canvas X: -642.583 From Canvas Y: 1071.691 Label X: -69 Label Y: -12 Downstream: TOTAL Route: None End: Default Attributes: Default Basin Unit System: English Default Meteorology Unit System: SI Default Loss Rate: SCS Default Transform: SCS Default Baseflow: None Default Route: Muskingum Cunge Standard Enable Flow Ratio: No Enable Evapotranspiration: No Compute Local Flow At Junctions: Yes

Missing Flow To Zero: No

End:



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JOB 25-100794	<u></u>
SHEET NO.	of1
CALCULATED BY RPH	DATE 7/7/04
CHECKED BY	DATE
SCALF	

proposed Lag Times

Basin H

Use
$$N = 0.02$$
 instead of $N = 0.03$

Corps $T_i = 24(0.02) \left[\frac{11235(0.55b)}{(279.4)^2} \right]^{0.38}$
 $= 0.143 \text{ Ws} = 8.6 \text{ min}$

$$T_{p} = 0.862(8.6) = 7.4 \text{ min}$$
 $NR(S T_{i} = 7.4 - 1) = 6.4 \text{ min}$

Basin USE N = 0.02 Corps Ti = 24(0.02) [0.605(0.298) / (355.4)/2] = 0.082hs= 4.9 min Tp= 0.862 (4,9)= 4.2 min NRCS T' = 4.2-1= 3.2 min

Basin L
USE
$$n=0.02$$

Corps $T_c = 24(0.02) \left(0.339 \times 0.058\right) / (59)^{1/2} = 3.0 \text{ min}$
 $T_p = 3.0 \left(0.862\right) = 2.6 \text{ min}$
NRCS $T_c = 2.6 - \frac{2}{3} = 1.6 \text{ min}$

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Date: June 2003

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WORKSHEET 4-2

Basin H
(name of project)

Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A
2-acre		С	77	0,35	27.0
SB	fair	С	63	0.15	9.5
WG	fair	С	77	0.05	3,9
1-acre		С	79	0.35	27.7
RC	Poor	C	84	0.05	4.2
W6	fair	A	44	0.05	2.2
			Sums =	1.000	-1

Sums = 1.000

For entire basin $CN_2 = _74,5$

San Diego County Hydrology Manual Date: June 2003

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Appendix D 2 of 3

WORKSHEET 4-2

Proposeo

Basin K Curve Number Worksheet

(name of project)

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN₂:

column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A
2-acre		\mathcal{Q}	82	0.25	20,5
RC	poor	Œ	79	0.05	4.0
2-acre		C .	77	0.15	11,6
RC	Poor.	С	84	0.40	33.6
W6	fair	D	82	0.05	4.1
RC	poor	D	88	0.05	4,4
SB	fait	C	63	0.05	3,2
			• • • • • • • • • • • • • • • • • • • •		h

Sums = 1.000

For entire basin $CN_2 = 2/4$

San Diego County Hydrology Manual
Date: June 2003

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Page: 2 of 3

WORKSHEET 4-2

Bosin L
(name of project)

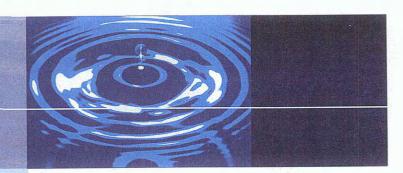
Curve Number Worksheet

RUNOFF CURVE NUMBER (for PZN Condition = 2.0) CN_2 :

·	T			1 5	
column 1	column 2	column 3	column 4	column 5	column 6
GROUND COVER/ LAND USE	HYDROLOGIC CONDITION (field in- spection)	SOIL GROUP	CN ₂ From Hydrology Manual, Table 4-2	FRACTION OF AREA A _i /A	PARTIAL CN ₂ CN ₂ x A _i /A
WG	fair	В	65	0.05	3.3
RC	poor	В	79	0.05	3,9
RC	Poor	C	84	0.25	21.0
53	foil	C	63	0.10	6.3
2-acre		C	77	0.25	19.2
RC	Poor	۵	88	0,10	8.8
5B	for	D	70	0,05	3.5
2-acre		D	82	0.15	12.3
			Sums	= 1.000	

Sums = 1.000

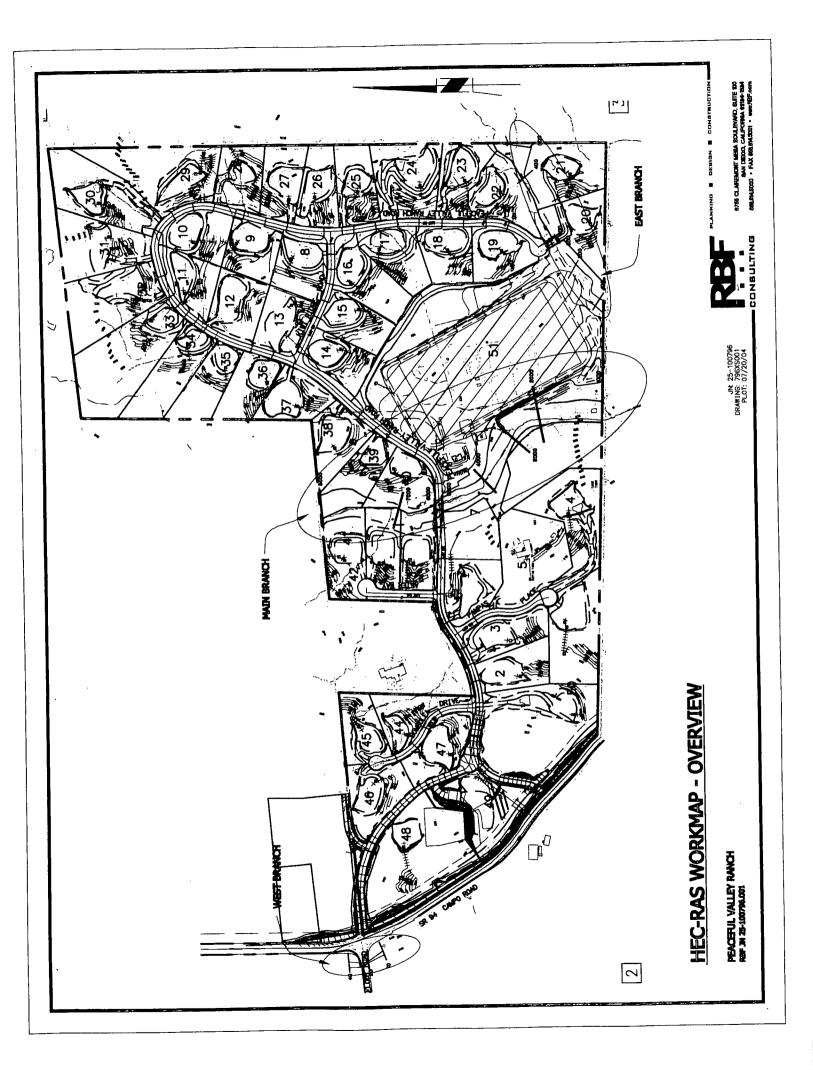
For entire basin $CN_2 = _78.3$

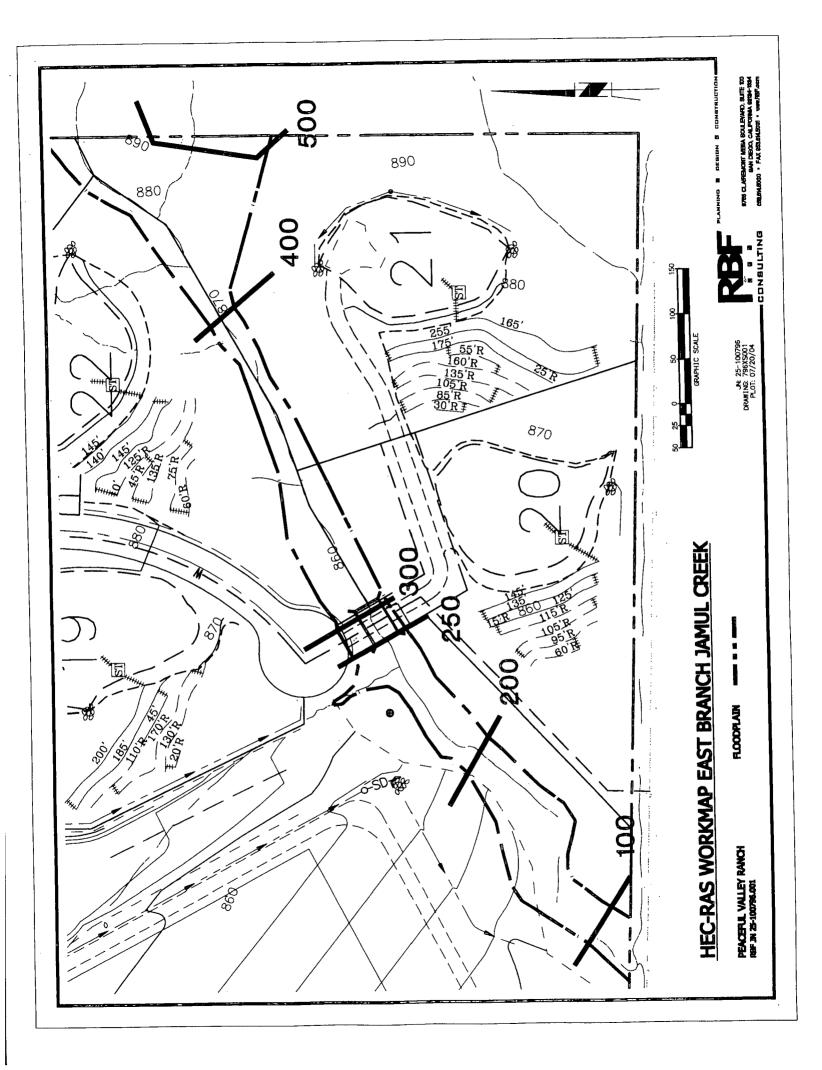


APPENDIX C Floodplain Inundation Analysis

This Section Contains:

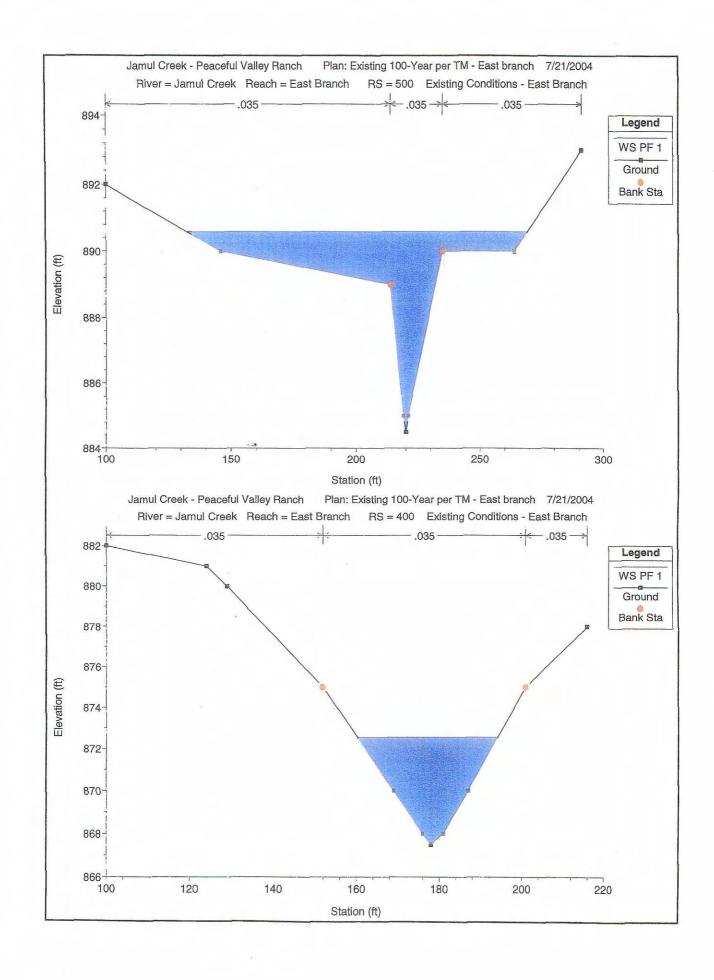
- East Branch Work Map
 - o HEC-RAS Cross Sections
 - HEC-RAS Summary Output
- Main Branch Work Map
 - o HEC-RAS Cross Sections
 - o HEC-RAS Summary Output
- West Branch Work Map
 - HEC-RAS Cross Sections
 - HEC-RAS Summary Output

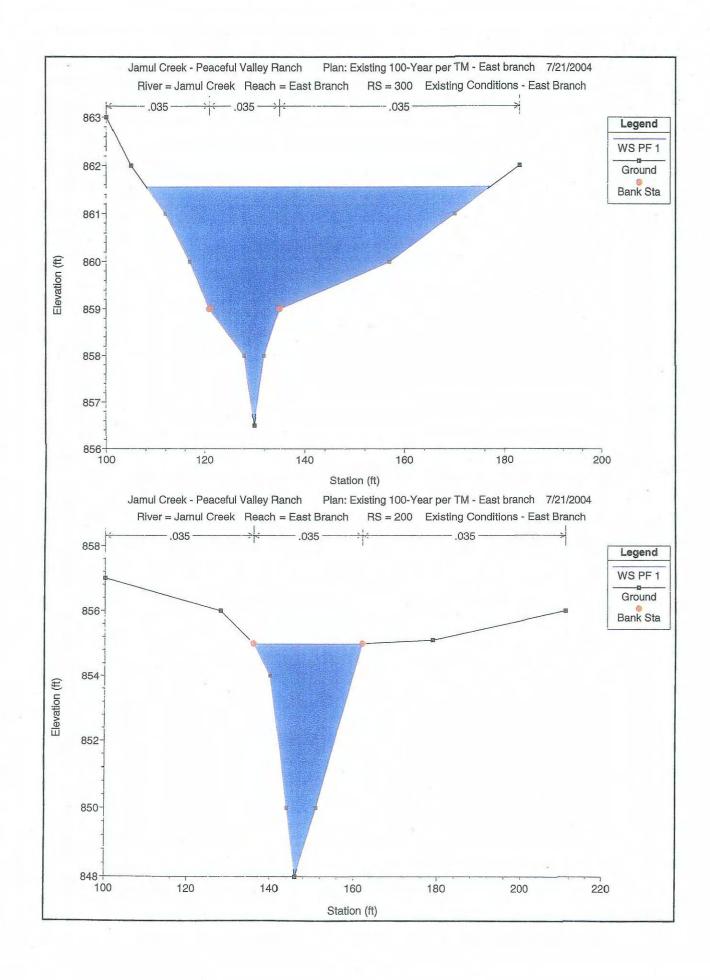


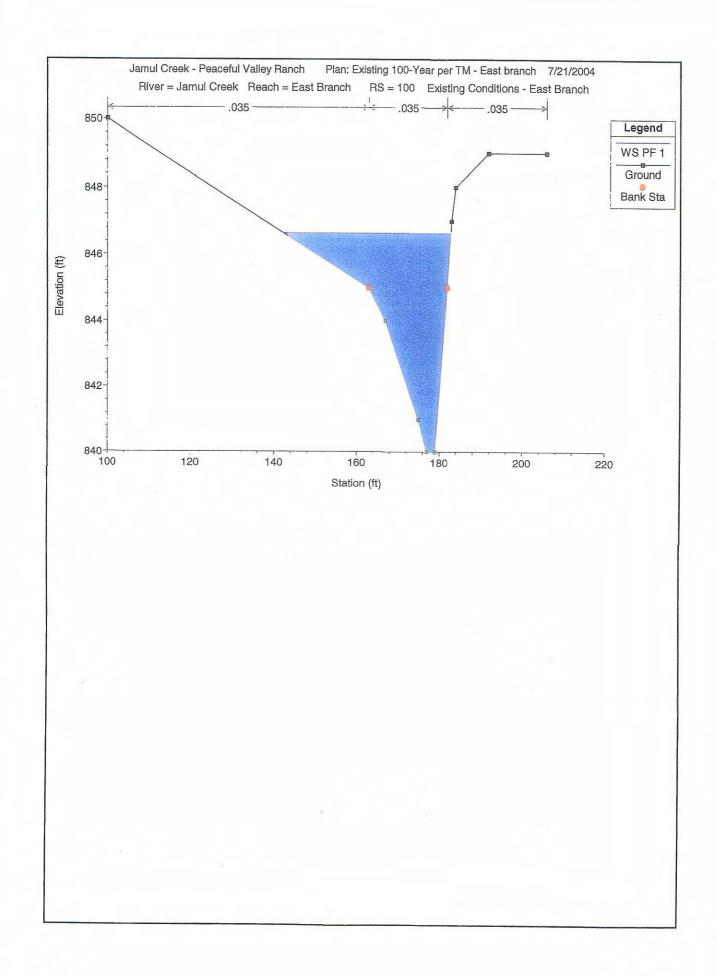


HEC-RAS Plan; EX-EAST River; Jamul Creek Reach; East Branch Profile; PF 1

o Width Frauda # Chl	(#)	135.65 0.70			68.06		70.10	
Flow Area	(Sa ft)	164.45	88 57	10:00	119.71	70.04	19.01	94.14
Vel Chnl		7.34						9.71
E.G. Slope	(ft/ft)							
E.G. Elev		891.15		-				
Crit W.S.	1							
W.S. Elev	(tt)	890.55	872.50		861.50	854.86		846.56
Ш	£)	884.50	867.50	(11)	856.50	848.00		840.00
Q Total	(cfs)	816.00	816.00	0000	816.00	816.00		816.00
Profile	7	PF1	PF1	7 10		PF 1		-
River Sta		200	400	300	200	200	100	201
Reach		East Branch	East Branch	Fast Branch		East Branch	Fact Branch	or Dialicit



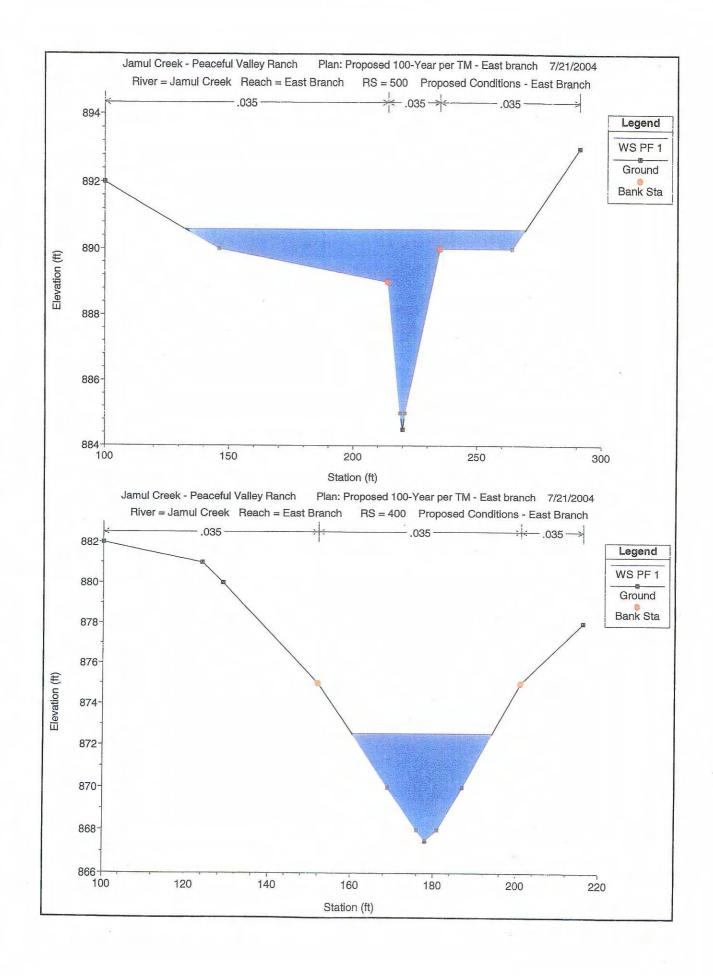


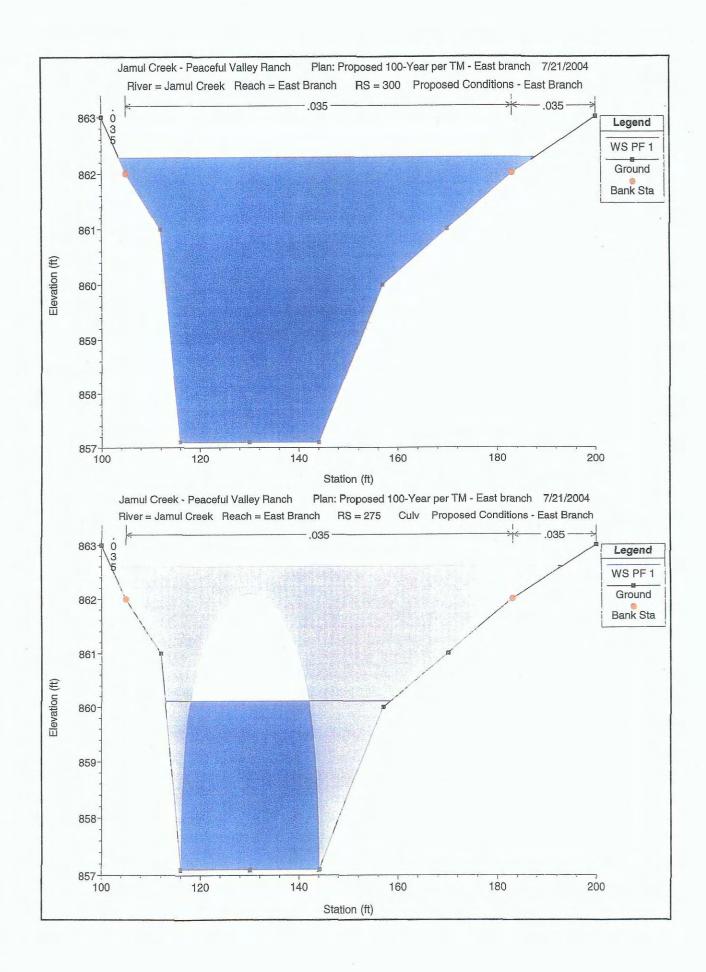


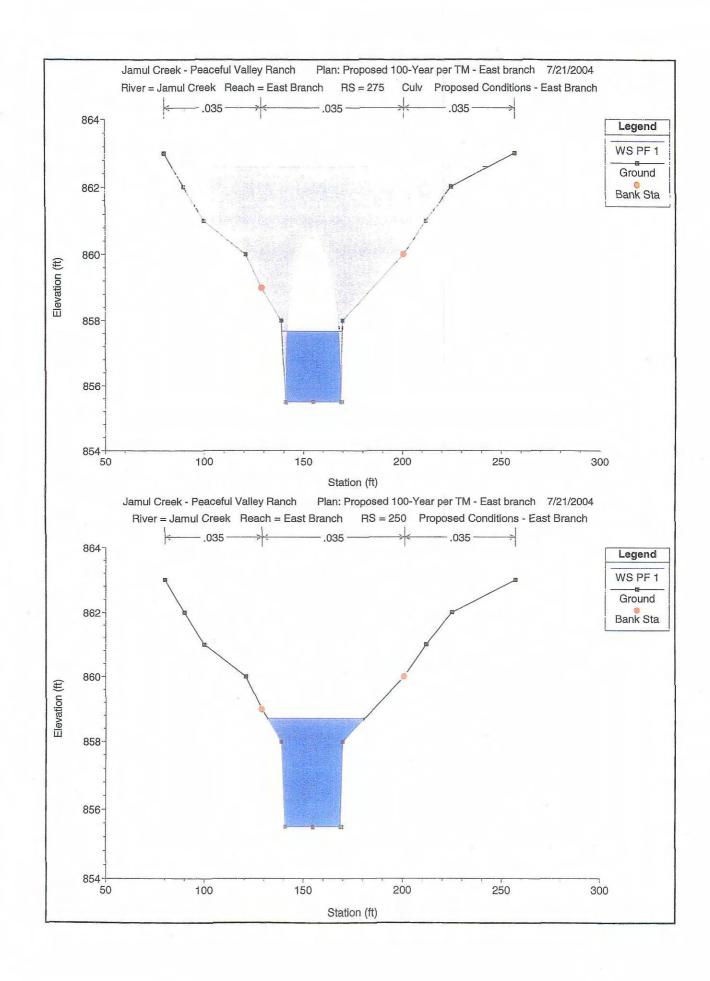
HEC-HAS Plan: PH-EAS! Hiver: Jamul Creek Heach: East	III. PR-EASI											
Reach	River Sta	P.	Q Total		W.S. Elev	Crit W.S.	ш			Flow Area	Top Width	Fronde # Chl
			(cfs)	(#)	(H)	(£)		(ft/ft)	(ft/s)	(sd ft)	_	
East Branch	200	PF 1	816.00	884.50		890.55			7.34	164.45	135.65	0.70
East Branch	400	PF 1	816.00	867.50	872.49	872.49	873.82	0.013729	9.23	88.38	33.45	1.00
East Branch	300	PF 1	816.00	857.10	862.16	859.80		0.001579	3.46	235.80	81.43	0.35
East Branch	275		Culvert									
East Branch	250	PF 1	816.00	855.50	858.65	858.65	859.70	0.015226	8.22	99.28	47.57	1.00
East Branch	500	PF 1	816.00	848.00	854.86	854.86	856.48	0.015130	10.22	79.81	25.10	1.01
East Branch	100	PF 1	816.00	840.00	846.56	846.56			9.71	94.14	39.45	0.84

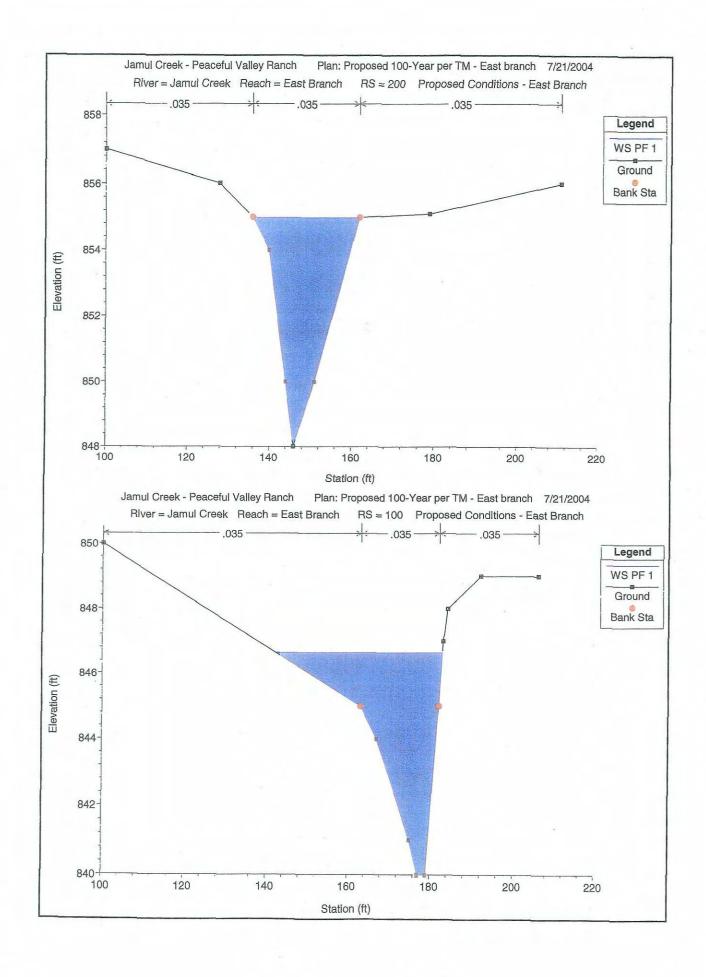
7

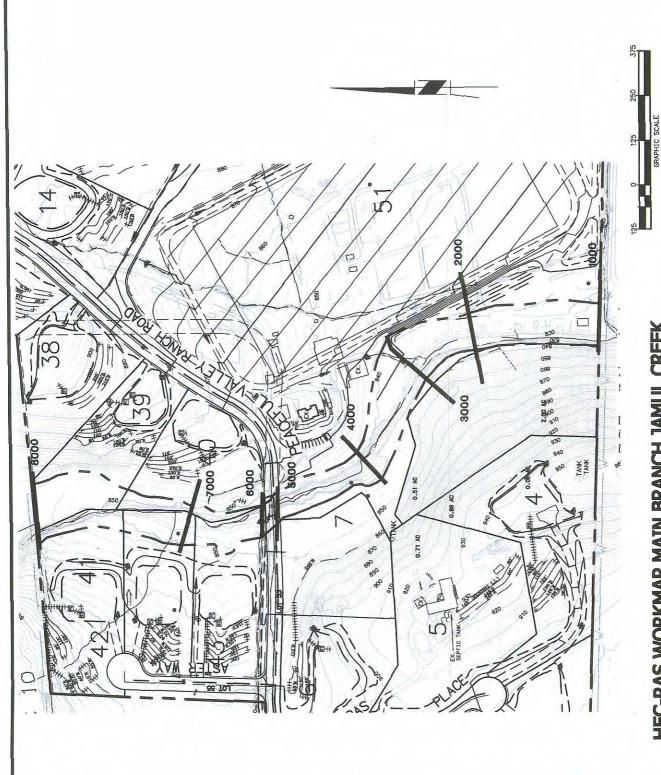
NAME OF STREET











HEC-RAS WORKMAP MAIN BRANCH JAMUL CREEK

PEACEFUL VALLEY RANCH NSF JN 25-200796.003.

FLOODPLAIN

JN: 25-100796 DRAWING: 796XS001 PLOT: 07/20/04

Section 2

B756 CLAMBAONT MEBA BOULEVAND, BUTTE 100 BAN DIEGO, CALIFORNIA 82124-824 858,84,500 - FAX 858,814,501 - www/HBF.com

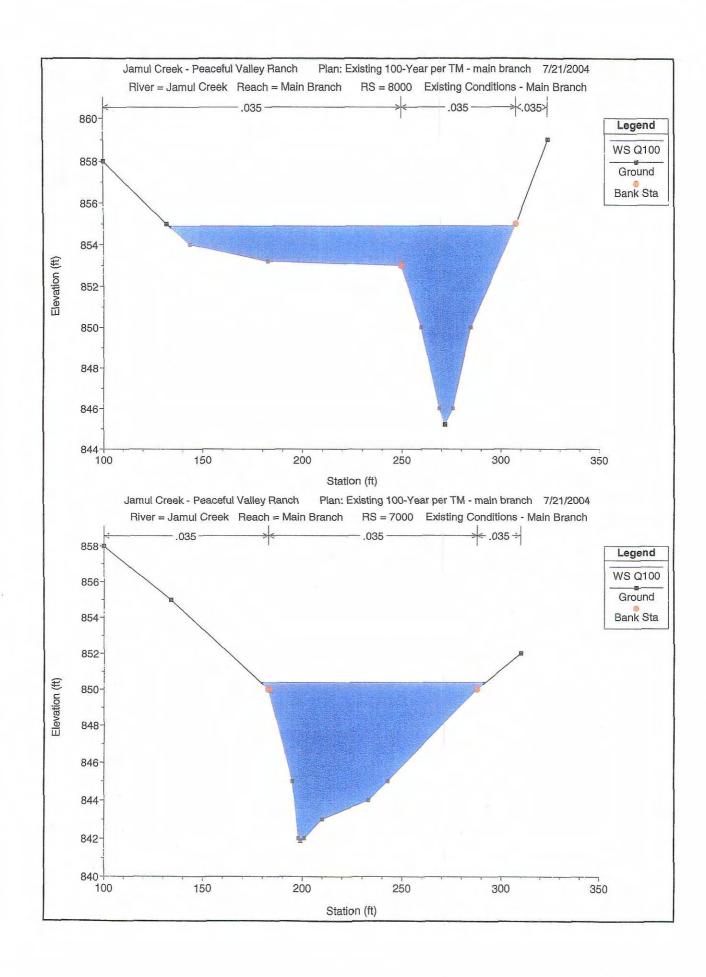
HEC-RAS Plan: EX-MAIN River: Jamul Creek Reach: Main Branch Profile: Q100

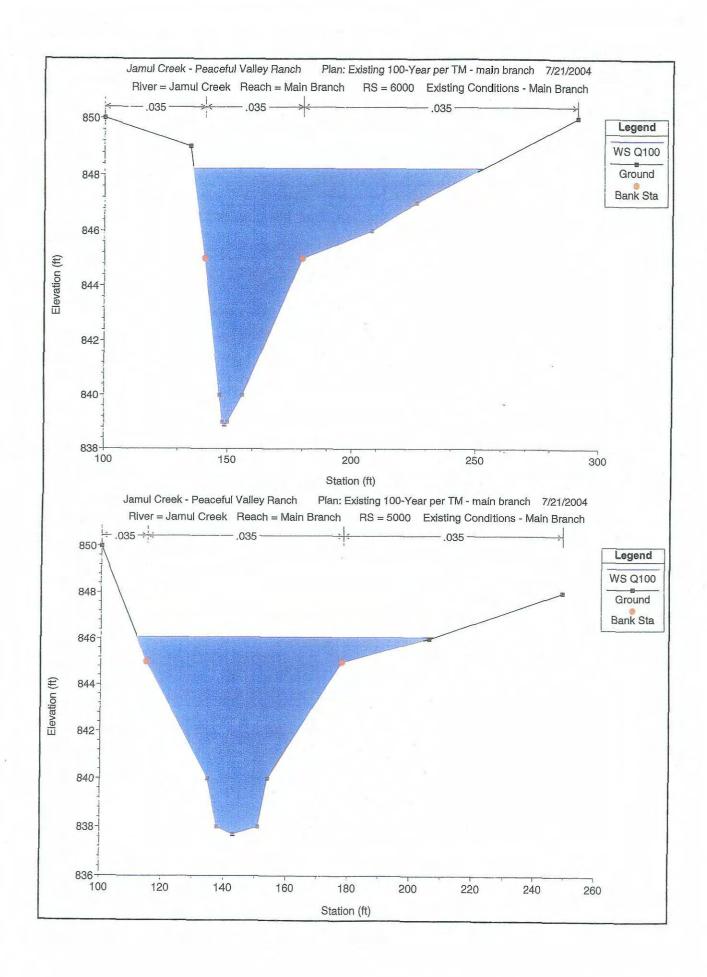
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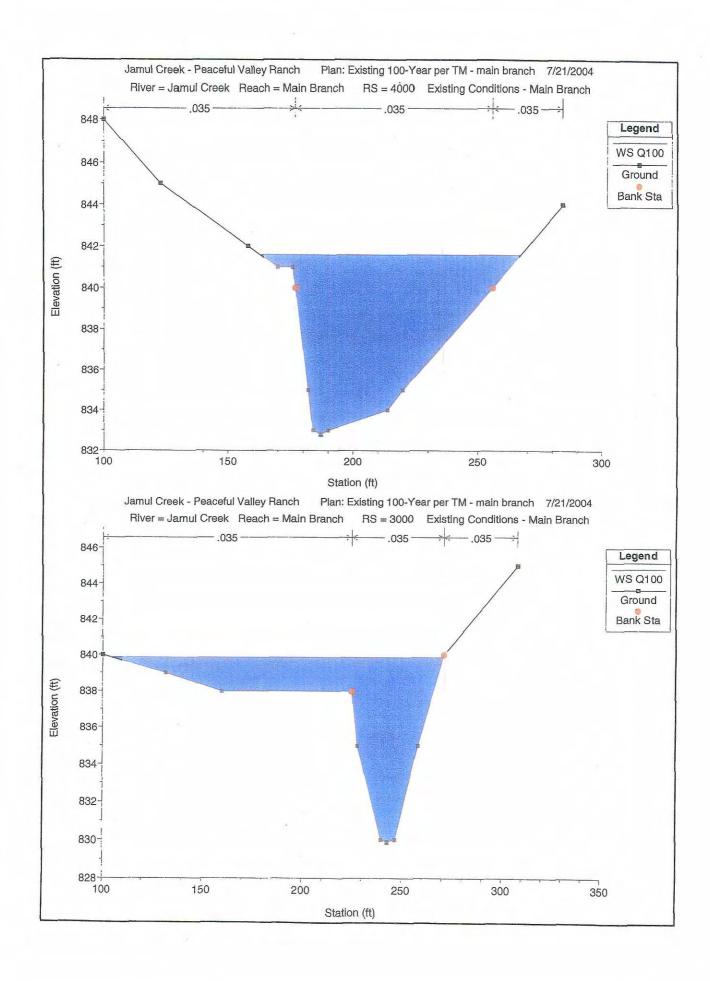
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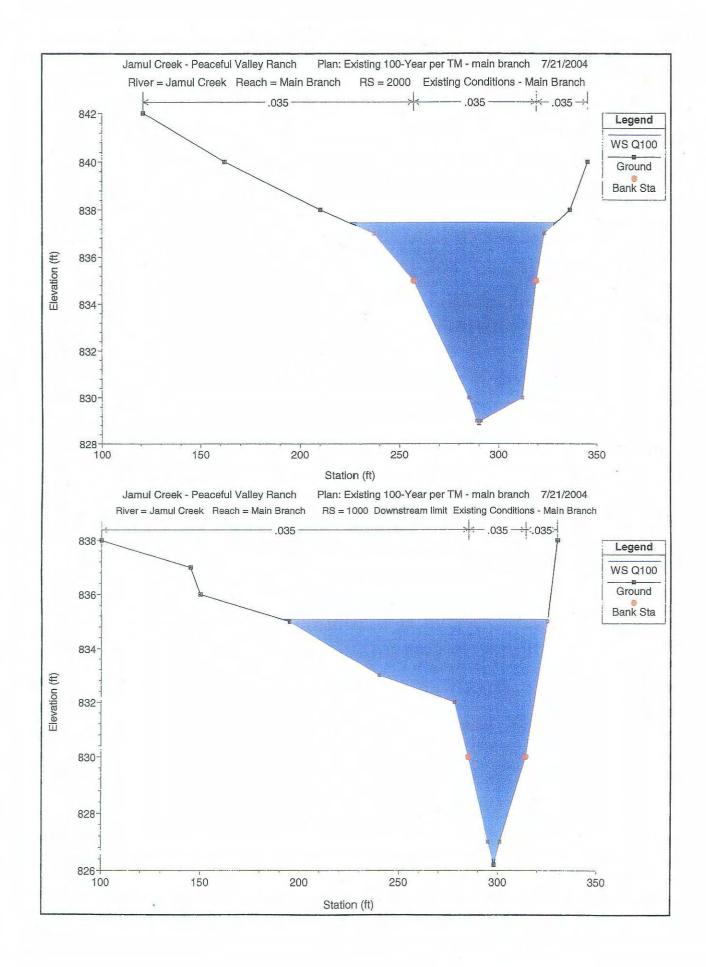
i (1)

-			- Lancier Lanc	Sales Section (Section 2011)								
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chul	Flow Area	Ton Width	Froude # Chi
			(cfs)	(#)	(#)	(#)	(#)	(#/#)	(446)	(00.4)	(4)	
Main Branch	0000	0400	00000	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-	7.0	(11)	(init)	(103)	(sd rr)	(π)	
Maill Dialicii	0000	200	3490.00	845.20	854.84	854.84	856.09	0.007097	986	444 31	173 35	07.0
Main Branch	7000	Q100	3490.00	841.90	850.33		851 11	0 003663	2007		000	0.70
Main Branch	0000	0.00	0				3	000000000000000000000000000000000000000	00.7		111.03	0.58
משווו הושווכוו	nnna	מאומה	3490.00	838.90	848.14	848.14	849.93	0.006924	11.58	373.49	114 51	La C
Main Branch	2000	00100	3490.00	837.70	845.98	845 98	848 00	0 000588	14 10	01 010	0000	10:0
	0000					00:010	00:010	0000000	04.11	04.0.0	93.32	0.93
Main Branch	4000	0100	3490.00	832.80	841.55		842.40	0.002983	7 30	483.43	102 54	0
Main Branch	3000	0100	3490.00	829.90	839.81	839.81	841 16		10.01	441.40	1000	0.00
Main Branch	2000	0100	3490 00	828 90	837.41		000		12.01	24.144	104.31	0.73
				2010	1.100		00.000	0.003923	0.00	423.23	15.20I	0.62
Main Branch	1000	0100	3490.00	826.20	835.01	835.01	836.77	0.006588	12.22	396.62	130.44	0.80
									Control of the second			30.0

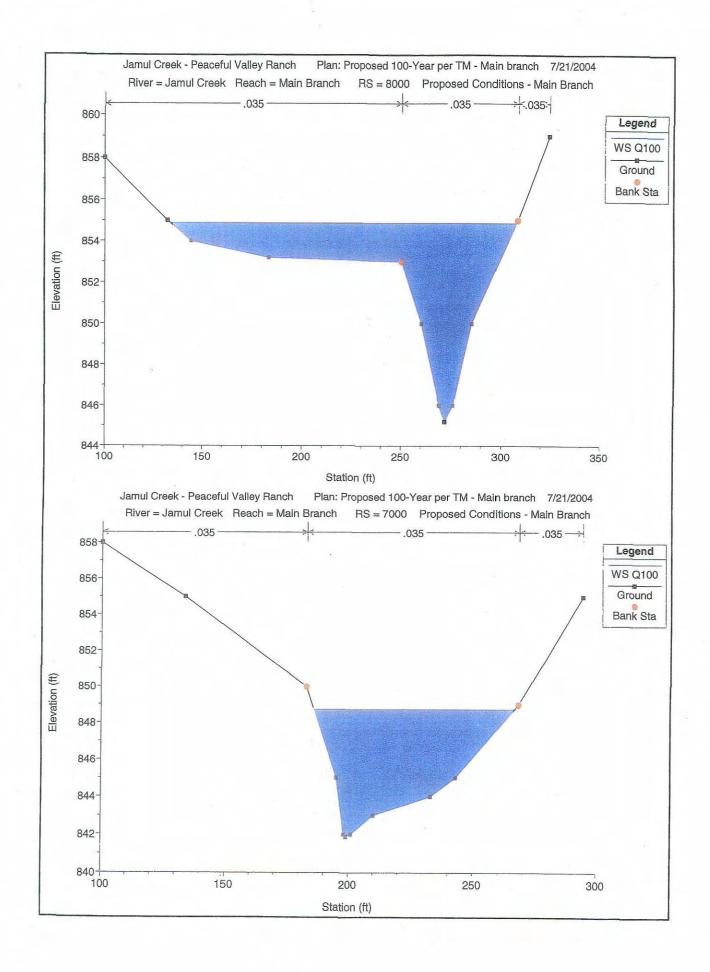


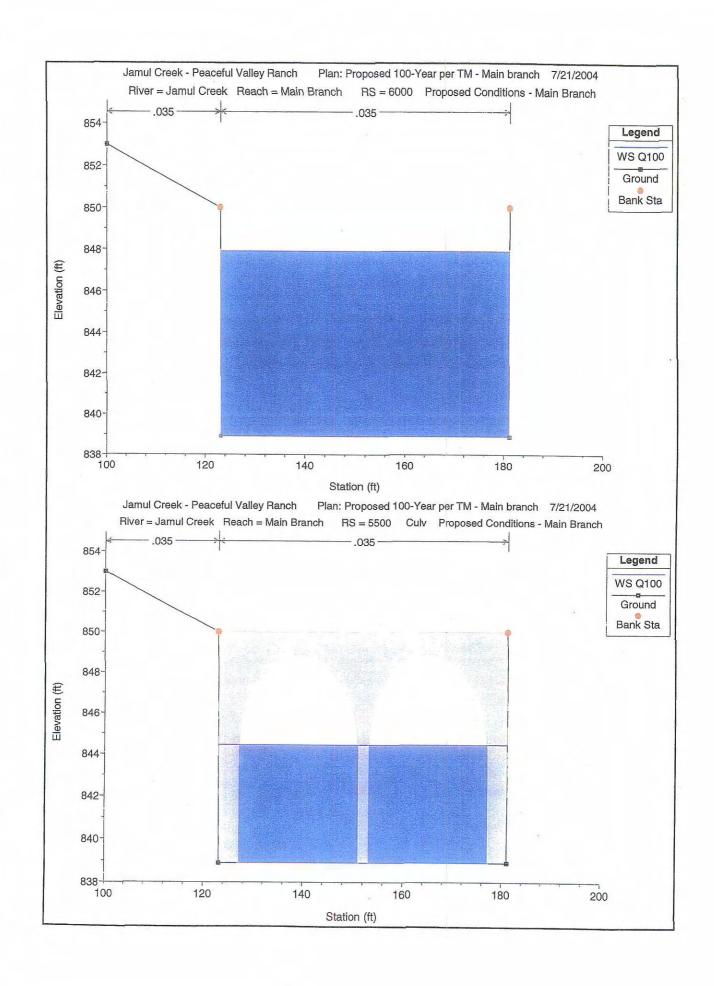


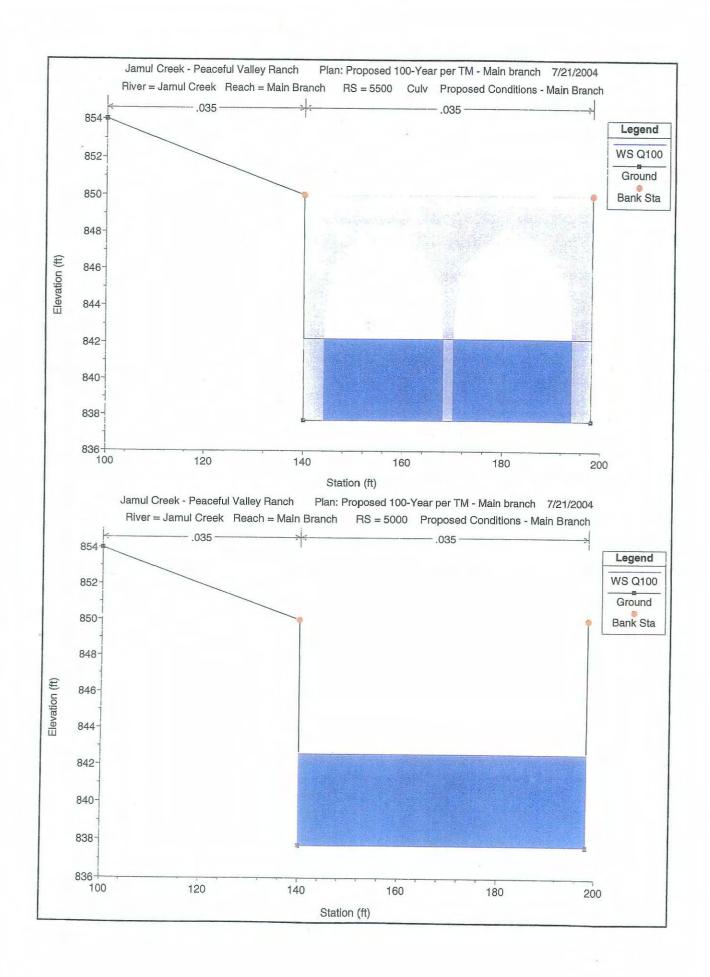


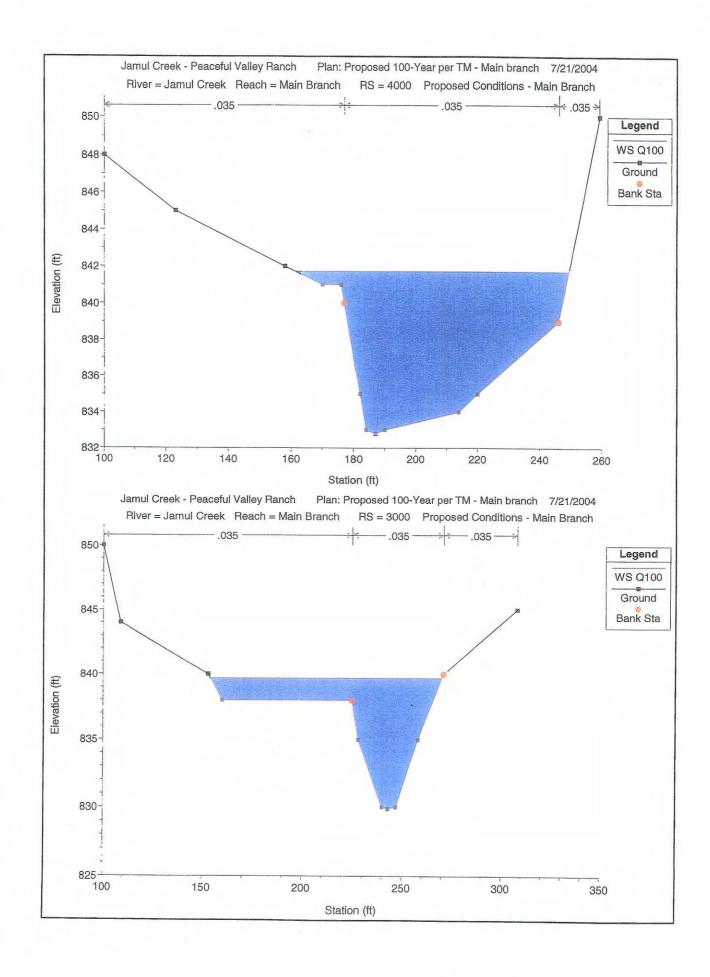


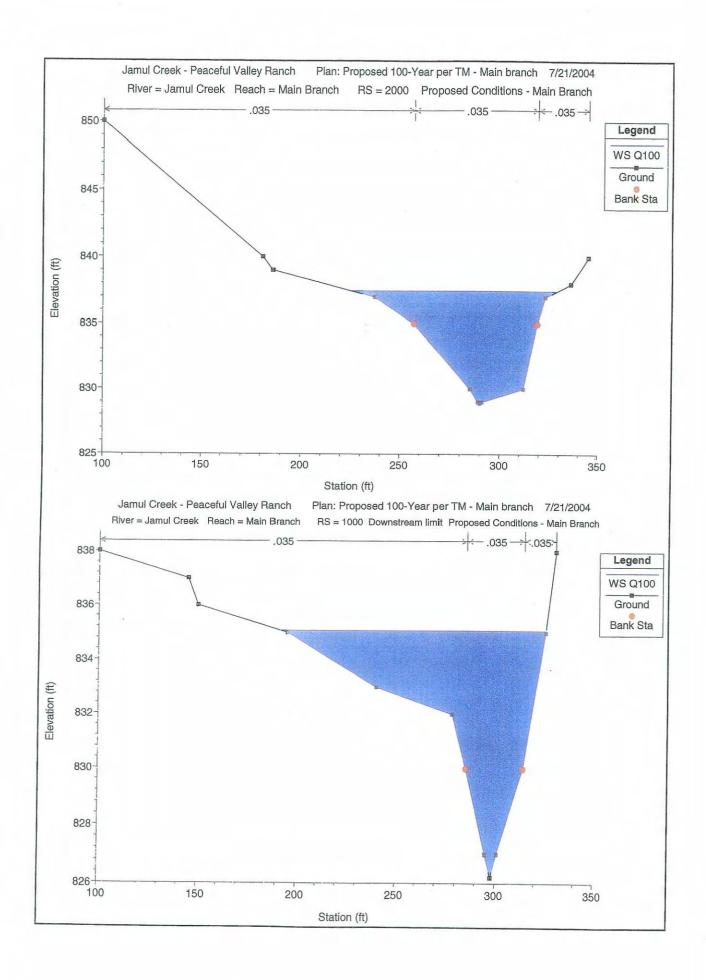
			The state of the s			-						
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev		Vel Chnl	Flow Area	Top Width	Froude # Chl
٠		1	(cfs)	(#)	£)	(tt)	(#)	(ft/ft)	(ft/s)	(sq ft)	(#)	
Main Branch	8000	0100	3490.00	845.20	854.83	854.83	856.09		9.88	443.27	173.25	0.79
Main Branch	7000	0100	3490.00	841.90	848.68	848.68	850.64		11.22	310.92	79.84	1.00
Main Branch	0009	00100	3490.00	838.90	847.77	843.71	848.49	0.001974	6.77	515.34	58.16	0.40
Main Branch	2500		Culvert									
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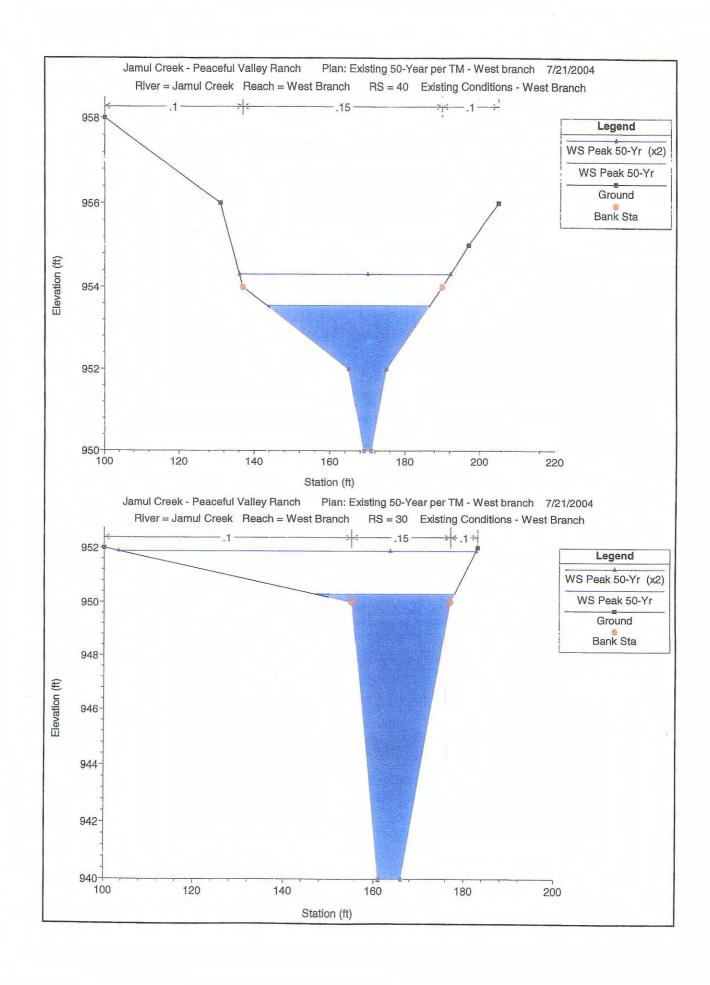


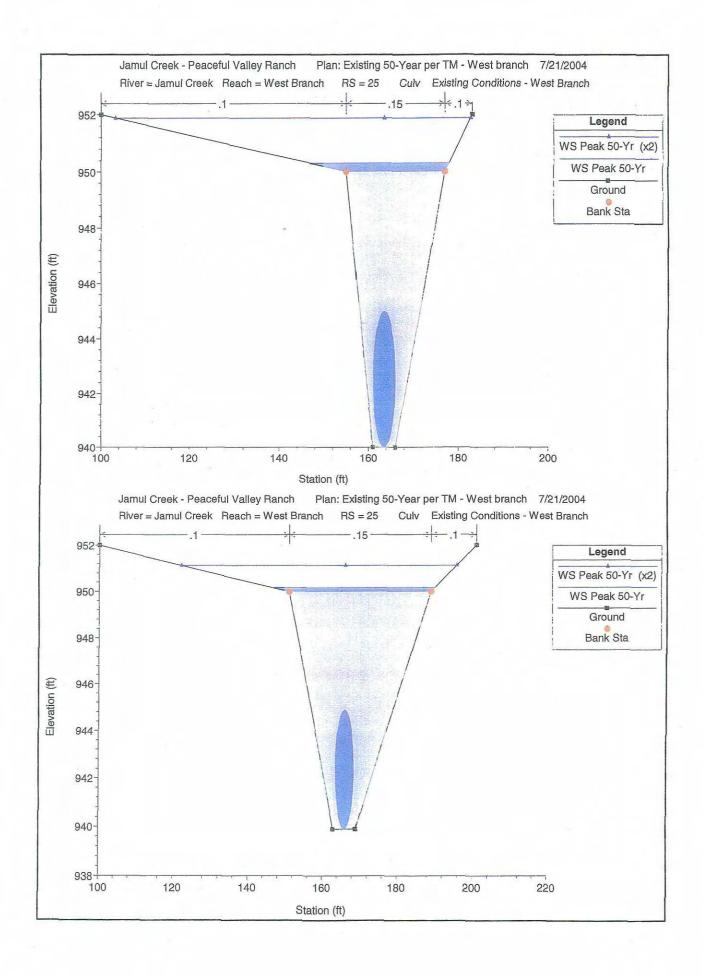


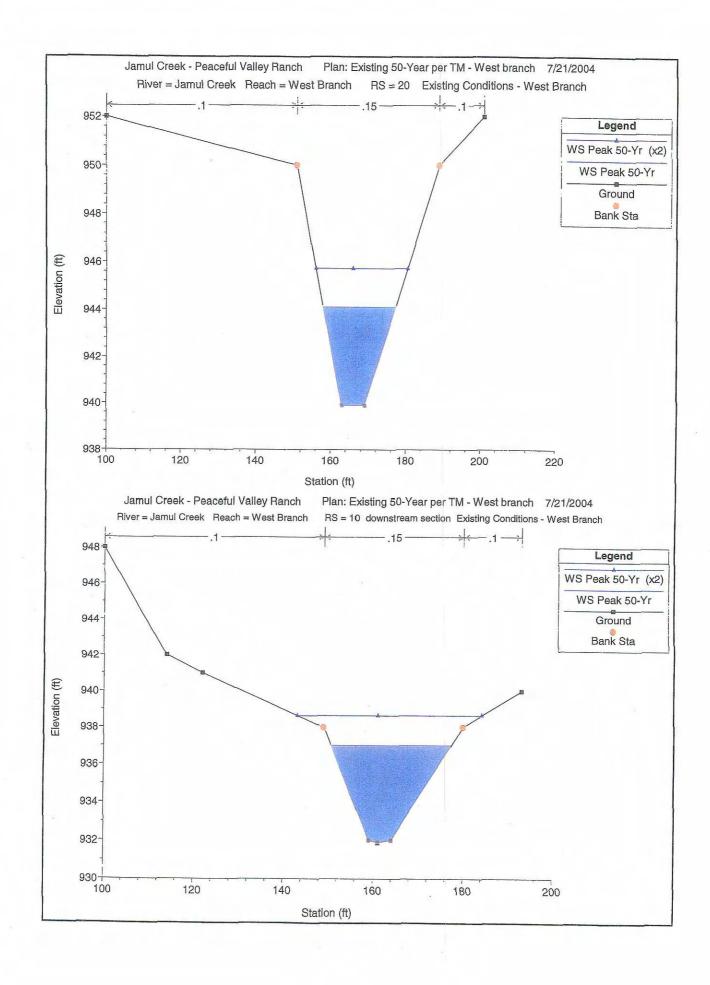


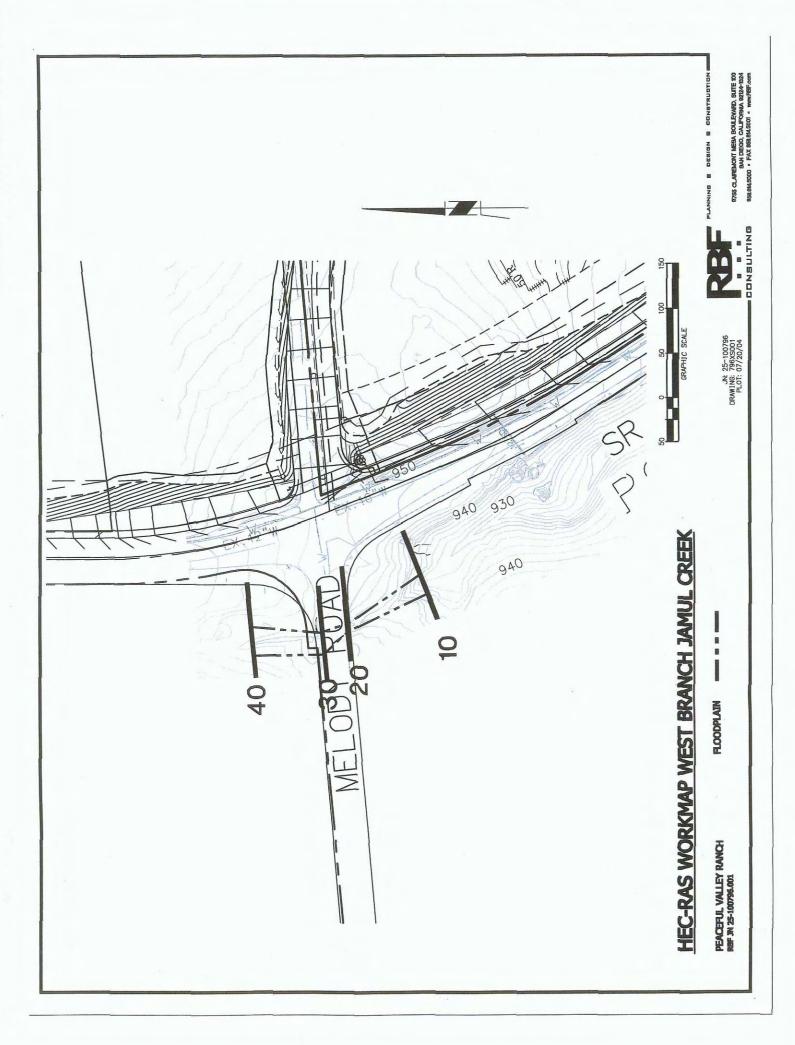


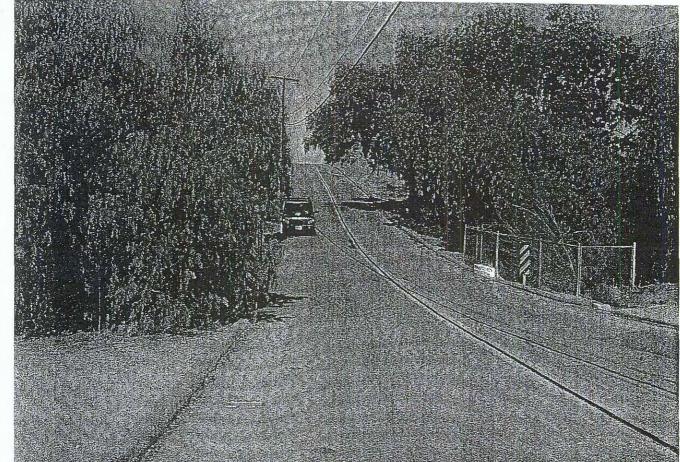




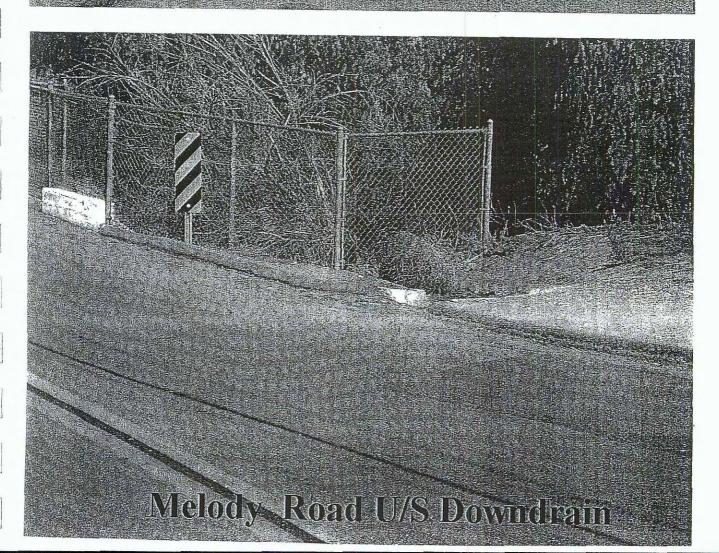


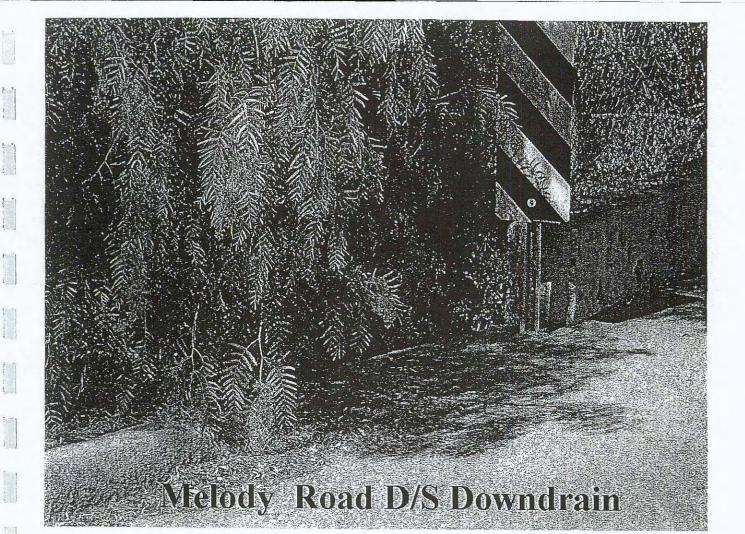






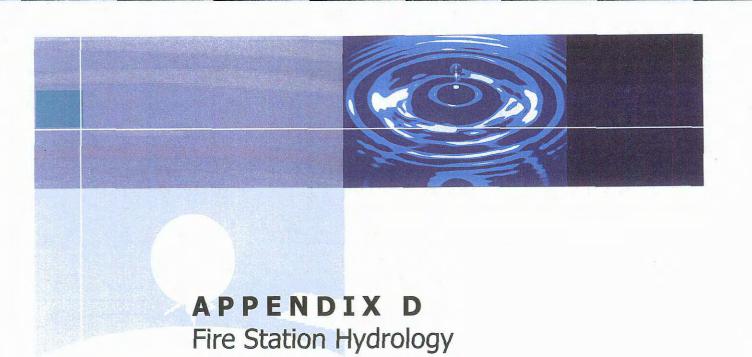
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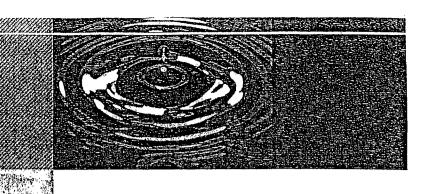








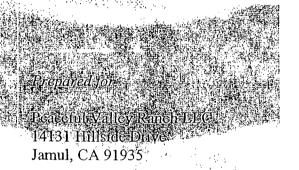
Study



CEQA Drainage Study

Peaceful Valley Ranch Fire Station San Diego, California

July 2004



Prepared by



RBF CONSULTING

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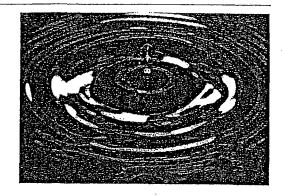


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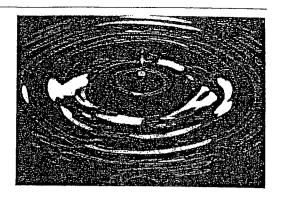
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Introduction

This drainage report presents an analysis of the effects the proposed Peaceful Valley Ranch Fire Station on the *quantity* and *pattern* of the storm water runoff from the local watershed. The purpose of this report is to help fulfill requirements of the California Environmental Quality Act (CEQA). Storm water *quality* is addressed in the Storm Water Management Plan (SWMP) for the project, which is under separate cover from this document.

This report examines the existing and proposed hydrology of the site and nearby vicinity and presents preliminary design of drainage facilities. This report is for planning purposes and does not present final design engineering recommendations for the project.

Section 1. Project Information

This section describes the location, activities, and hydrologic setting (watershed, topography, land use, soils and vegetation, drainage patterns, and impervious cover) of the project site.

1.1. Project Description

1.1.1 Project Location

The project site is located in the community of Jamul in San Diego, California. The project is located just east of SR-94/Campo Road (reference Thomas Bros. 1291-J3) provides a location map for the site.

1.1.2 Project Activities Description

The Peaceful Valley Ranch Fire Station project construction of administration buildings for both the Rural Fire Protection District and US Fish and Wildlife Service (totaling approximately 14,100 sf.), related parking, access drives, a fuel storage tank, and utility services. Sewage service for the site will be provided by means of an on-site septic system. The project site is approximately 3.7 acres. Future improvements that impact site drainage consist of construction of an equestrian path as well as an 8' wide shoulder along the Campo Road frontage.

1.1.3 Topography and Watershed Patterns

The topography of the site creates two basic watersheds. Watershed "A" drains to an existing 12" storm drain in Campo Road, immediately adjacent to the existing access drive. Watershed "B" drains towards an existing swale off the southeast property corner. This swale ultimately discharges to Jamul Creek. A natural ridge divides the two watersheds and there is approximately 50' of elevation difference between the ridge high point and the study points for each watershed. Existing and proposed topography, with watershed delineation is shown on the enclosed Pre and Post Development Watershed Maps (Exhibits C and D)

1.1.4 Soil and Vegetation Conditions

No soils report has been prepared at this preliminary stage of the project. Therefore, the Soil Survey for the San Diego Area by the Soil Conservation Service (1973) forms the basis of this discussion.

The Soil Survey indicates that Las Ponas Stony Fine Sandy Loam (Type D), Fallbrook Sandy Loam (Type C), and Ramona Sandy Loam (Type C) soils are present. Existing groundcover could best be described as a moderate grassy meadow. Existing delineation of various site soils are shown on the enclosed Pre and Post-Development Hydrology Maps (Exhibits C and D)

1.1.5 Floodplain Mapping

The Federal Emergency Management Agency (FEMA) has not mapped any Special Flood Hazard Areas (SFHAs) for Jamul Creek on the project site. The San Diego County Comprehensive Flood Control Plan for Flood Control District Zone 4 (1975) states that the peak 100-year discharge on the local reach of Jamul Creek will be approximately 2671 cfs. The inundation area corresponding to this peak discharge does not encroach into either of the project watersheds. (See Exhibit 'B')

1.1.6 Downstream Conditions

Because Post Development Runoff has been limited to pre-development levels, no adverse impact to receiving structures or watercourses will occur.

1.1.7 Impervious Cover

The only existing impervious cover is from the site access drive as well as the portion of Campo Road that drains to the adjacent 12' pipe. Proposed impervious surfaces are related to the proposed parking and driveway areas, the two administration buildings, the future equestrian paths, and the future 8' wide shoulder along Campo Road. Existing and proposed impervious surfaces are delineated on the enclosed Pre and Post-Development Watershed Maps (Exhibits C and D).

1.2. Proposed Runoff Management Facilities

The proposed facilities managing runoff from the site include:

- Appropriate grading of pads to direct runoff away from structures on the site.
- Storm drain systems to direct on-site runoff to appropriate outfalls.
- Vegetated swales that will intercept runoff for treatment before directing the discharge offsite.

Section 2. Methodology and Design Criteria

This section summarizes the design criteria and methodology applied during drainage analysis of the project site. The design criteria and methodology follow the County of San Diego Hydrology Manual, Hydraulic Design and Procedure Manual, and Storm Water Standards as appropriate for the project site.

2.1. Hydrologic Design Methodology

Rational Method: Peak Flow

Runoff calculations for this study were accomplished using the Rational Method. The Rational Method is a physically based numerical method where runoff is assumed to be directly proportional to rainfall and area, less losses for infiltration and depression storage. Flows were computed based on the Rational formula:

$$Q = CiA$$

where ...

Q = Peak discharge (cfs);

C = runoff coefficient, based on land use and soil type;

i = rainfall intensity (in/hr);

watershed area (acre) A =

The runoff coefficient represents the ratio of rainfall that runs off the watershed versus the portion that infiltrates to the soil or is held in depression storage. coefficient is dependent on the land use coverage and soil type (Table 2-1).

For a typical drainage study, rainfall intensity varies with the watershed time of concentration. The watershed time of concentration at any given point is defined as the time it would theoretically take runoff to travel from the most upstream point in the watershed to a concentration point, as calculated by equations in the San Diego County Hydrology Manual.

Peak discharges were computed for 100-year, 50-year, and 10-year design storm frequencies. Rainfall intensity was calculated using the method described in Section 3.1.3. of the San Diego County Drainage Manual.

Table 2-1 Basic Rational Method Runoff Coefficients.

RUNOFF COEFFICIENT										
A	В	C	D							
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Section 3. Hydrologic Effects of Project

This section characterizes the quantities and location of storm water runoff from the project site. Discussion of the water quality aspects of the project can be found in the Storm Water Management Plan (SWMP), which is under separate cover from this report.

3.1. Drainage Patterns

The proposed project will not significantly alter drainage patterns on the site. Runoff from the project site may be concentrated at storm drain outfalls but is not substantially diverted from its existing outlet locations.

3.2. Impervious Cover

The project will add approximately 65,000 square feet of impervious area (33% percent of the total project site) in the form of rooftops, parking and access drives, etc. Because of the increase in impervious area, resultant increases in runoff have been calculated.

3.3. Peak Runoff

Table 3-1 summarizes the hydrologic effects in terms of calculated peak runoff from the project site. In general, study point "A" will not experience an increase in peak runoff, while study point "B" will be subject to increases of roughly 300%. However, with provision for a detention basin of approximately 19,820 cubic feet, we believe runoff can be detained to predevelopment levels.

Table 3-1	Summary of Hydrology Analysis.

	100-Year	$(P_6=3.1 in)$	50-Year	$(P_6=2.7 in)$	10-Year (P ₆ =2.0 in)				
Outlet Location	ľ	/Proposed /(cfs)		/Proposed)/(cfs)	Existing/Proposed (cfs)/(cfs)				
Study Point "A"	10.6	10.7	9.2	9.2	6.7	6.9			
Study Point "B"	7.4	*23.2	6.4	*20.1	4.8	*15.0			
TOTAL	18.0	*33.9	15.6	*29.3	11.5	*21.9			

^{*} Increase in runoff to be mitigated by provision of a minimum 19,820 FT³ detention pond.

Section 4. Summary and Conclusions

This section provides a summary discussion of the potential effects of the proposed project on local water resources in terms of quantity and location.

- * The proposed project will not significantly alter drainage patterns on the site. Runoff from the project site may be concentrated at storm drain outfalls but is not diverted in significant quantities from its existing outlet locations.
- * The project will add approximately 65,000 square feet of impervious area (33 percent of the project site) in the form of building, parking, driveway access, and other improvements
- Study Point "A" (existing 12" pipe in Campo Road adjacent the access drive) will not experience any increase in runoff. Study point "B" (within the existing swale just off the southeast corner of the site) will experience runoff increases at a magnitude of 300%.
- * A detention basin of approximately 19,820 cubic feet can be provided to limit storm water discharge from watershed 'B' to pre-development levels.

Section 5. References

FEMA, 1997. FEMA. (June 17, 1997). Flood Insurance Study, San Diego County.

San Diego County, 2003. San Diego County Flood Control District. (June 2003). Hydrology Manual.

SCS, 1973. Soil Conservation Service. (December, 1973). Soil Survey, San Diego Area, California.

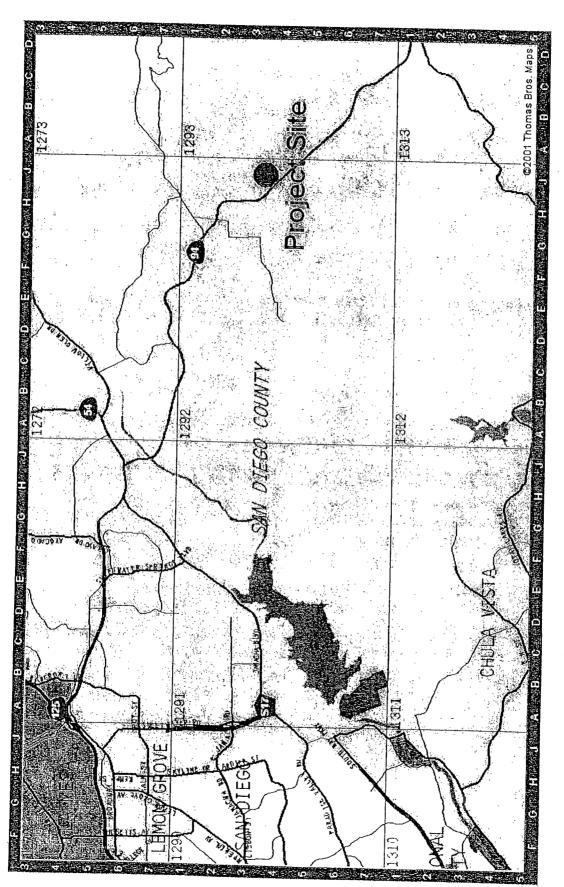
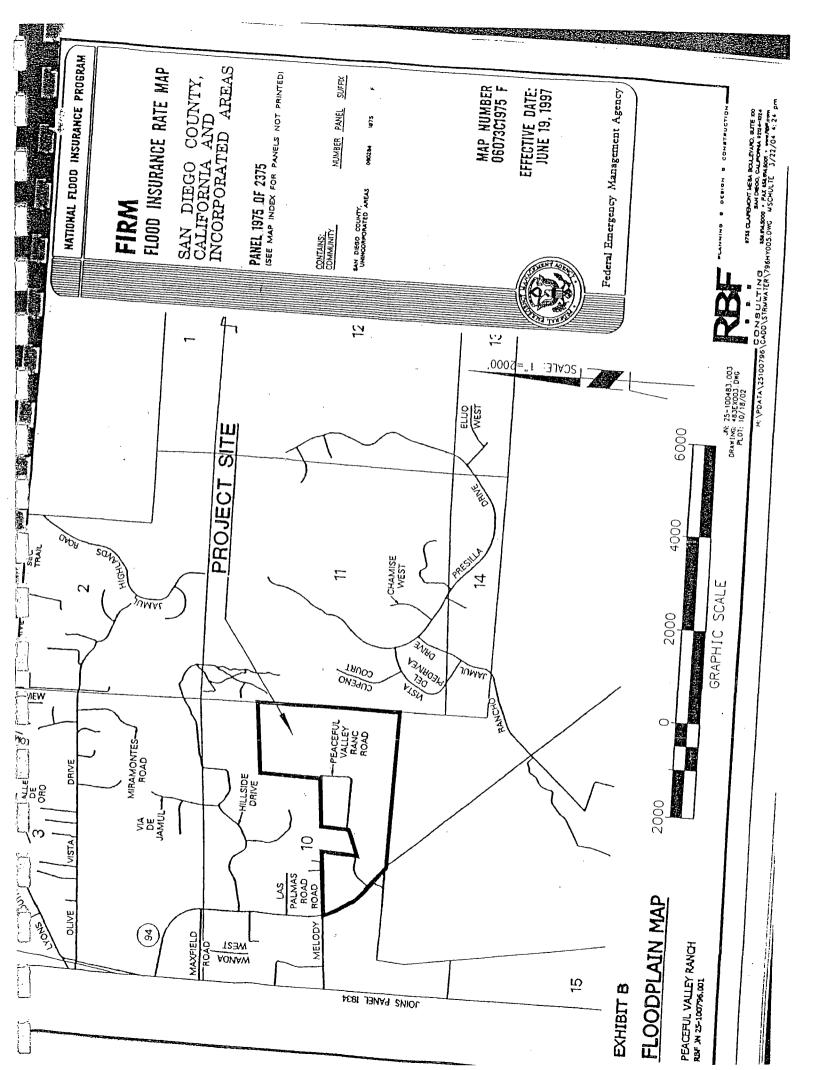


Exhibit A Vicinity Map (Reference Thomas Bros. 1292-J3)







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BASIN STEPPER VOLUME = CPL A : 0.56 (3.11m) (6.05 PC) - 8.27 AC-IN PRE DEVELOPMENT HYDROGRAPH VOLUME: D.45 (2.1m) (3.03 AC) - 4.22 AC-IN - 18,516 FT = 1/20/ SAFERY FACTOR 19,820 FT? REC 947 = 0 1,339 FC 948 2629 6397 EC 950: 3718 8,691 EC 950: 3718 8,691 EC 9592 4,973 16,427 EC 9592 6,278 (27678)				:	:						: 											· ; ·						:
POST DEVELOPMENT HYDERGENEN VOLUME = C.P. A = 0.86 (3.11m) (6.05 RC) = 8.87 AC-IN PRE DEVELOPMENT HYDERGENEN VOLUME = 0.45 (2.1m) (3.03 RC) - 422 RC-IN - 16,516 FT => u/20/ SAFETY FACTOR 19,820 FT ? READ 5,772 PLAN - 16,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? READ 5,772 PLAN - 18,516 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? READ - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? READ - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 => u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 == u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 == u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 == u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 == u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 == u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 == u/20/ SAFETY FACTOR 19,820 FT ? - 18,916 FT 3 == u/20/ SAFETY FACTOR 19,820		-			; ; ; ;	1 7	3	7 S 7	V			ZR	U E	V	n	m		5	און ד	207	Z-							
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PRE- DEVELOPMENT DRAINAGE CONDITION

PEACEFUL VALLEY RANCH FIRE STATION